APPENDIX A
SUPERCRITICAL UNITS

1.0 INTRODUCTION

This appendix includes data gathered on supercritical units. The objective of this exercise was to present the relationship between the development of the technology over time with respect to the capital cost. The relationship of technology maturity to price per kW could then be applied to the development of the clean coal technology presented in the main portion of this document.

This presentation of data on supercritical plants is based on information available from various sources. This information is a presentation of costs, plant components, and environmental controls; no attempt was made to develop operating costs for each of the plants. The Utility Data Institute, which provided a majority of the costing information, provides capital cost data in the year dollars the plant was constructed. There is no scope breakdown of the capital cost.

2.0 DATA

Cost data for pulverized coal supercritical units and subcritical units were gathered from various sources. Table 1 is a listing of sources used to compile the data presented herein. These data are presented as reported in Figure 1. Figure 2 presents these costs levelized to 1996 constant dollars. The cost data presented in Figure 2 include funds during construction.

Various attempts were made to normalize the data presented in Figure 1 to determine a predictable trend, rather than the scatter shown in Figure 1. Figure 3 has the data normalized to a 500 MW plant size. These data include all U.S. pulverized coal plants (supercritical and subcritical), including funds during construction. The data have been levelized to 1996 constant dollars and normalized to a 1.0 labor factor, thereby eliminating regional workforce differences.

Further attempts were made to segregate the data. Figure 4 presents U.S. subcritical plants, adjusted to 500 MW, including funds during construction, with the costs levelized to 1996 constant dollars and normalized to a 1.0 labor factor. Figure 5 goes one step further and normalizes these plants to contain a single unit; therefore, Figure 5 presents U.S. subcritical

plants, adjusted to 500 MW with a single unit, including funds during construction, with the costs levelized to 1996 dollars, and normalized to a 1.0 labor factor.

Figure 6 presents data for U.S. supercritical units, adjusted to 500 MW, including funds during construction, with the costs levelized to 1996 constant dollars, and normalized to a 1.0 labor factor. Figure 7 goes one step further and normalizes these plants to contain a single unit; therefore, Figure 7 presents U.S. supercritical plants, adjusted to 500 MW with a single unit, including funds during construction, with the costs levelized to 1996 dollars, and normalized to a 1.0 labor factor.

Additional attempts were made to identify trends in similar type facilities. Figure 8 shows U.S. supercritical units firing bituminous medium sulfur or high sulfur coal with flue gas desulfurization units, adjusted to 500 MW with a single unit, including funds during construction, with the costs levelized to 1996 dollars, and normalized to a 1.0 labor factor. Figure 9 presents U.S. supercritical units firing bituminous low sulfur coal without a flue gas desulfurization system, adjusted to 500 MW with a single unit, normalized to a 1.0 labor factor, including funds during construction, with constant 1996 dollars.

Figure 10 presents the trends of subcritical and supercritical plants in the U.S. over the last 30 years. Figure 11 adds the trend of plants built in foreign countries. Figure 12 presents the reported costs of foreign pulverized coal plants, adjusted to 500 MW size and to 1996 constant dollars. Very limited information is available for foreign power plants prior to 1991. Figure 13 displays international pulverized coal costs segregated by country.

Figure 14 exhibits the labor cost factor by region of the United States. This figure illustrates the differences in the labor rate depending on the region. Information from Figure 14 was used to adjust all costs presented to the national average or a 1.0 labor cost factor.

Figure 15 illustrates the components of investment for a 400 MW pulverized coal supercritical plant.

3.0 ANALYSIS

As previously stated, attempts were made to normalize all the data. To normalize for the region in which the plant was built, the labor factors presented in Figure 14 were utilized to equate the plant to a national average labor factor. All cost data gathered from published sources are in the year dollars that the plant came on line. These costs were escalated to 1996 constant dollars by use of the Handy-Whitman formula.

Figures 1 through 7 generally show increasing costs of building power plants. The results seen in these graphs are the influence of site-specific components, environmental regulations, and the scope of work included in the cost numbers reported. Figure 8 shows a decrease in the cost of building supercritical units with FGD, while Figure 7 shows an increase in overall plant cost. This is postulated to be due to the decrease in the cost of the FGD system rather than a decrease in the plant cost.

Plant costs are dependent on technology, time frame, and site. Increasing environmental regulations cause plants to add more equipment (e.g., FGD systems), lose potential capacity, and lose efficiency. Advanced technologies may have a higher capital cost, and be incorporated into the facility. These technologies will reduce operating costs, thereby reducing production costs; however, the data presented herein are solely a presentation of capital costs. The time frame in which the plant was built could have a significant impact on the capital cost, and the use of union or nonunion labor will also have a significant impact. The location in which the plant is built could also have a significant impact other than the labor rate, which we have normalized, because construction techniques differ depending upon the region. In the South, structures may be left open, and neither heat tracing nor train thawing is required. However, in the North, structures are enclosed, and the facility requires more insulation, as well as heat tracing or freeze protection.

The most significant factor influencing the data presented herein is the scope of the costs reported. We have no way of equalizing all costs reported to include similar items. Permitting and licensing may or may not be included. Civil amenities (e.g., fence, road, railway, geotechnical liners, etc.) may or may not be included. Byproduct (e.g., bottom ash, fly ash, FGD waste)

disposal areas may or may not be included. A second unit on an existing site will have lower capital costs reported, due to site facilities already being in place.

Limited historical information was available for the international units. Most of the data presented are cost estimated data for current or future construction.

4.0 CONCLUSION

The data presented are capital cost data, with little supporting information. All attempts at normalizing or levelizing the data to get a true trend analysis failed. The data are historical, which provides relationships between data points; however, to get a true concept of the power plant development of the last 20 years, more information is required. The relationship between technology maturity and capital cost was not shown in the data gathered.

Table 1

Source No.	Title	Title of Journal/Periodical	Date	Year
1	Assesment of Supercritical Power plant Performance	EPRI CS-4968	December	1986
2	Electric Power Plant Construction Costs	UDI-2053-96	April	1996
3	Power	Vol 140	April	1996
4	Power	Vol. 137	April	1993
5	Sven Kjaer. Elsam 400 MW coal-fired USC power plant Investigation	3rd Conference on Improved coal POwer plants	April	1991
6	Highest Supercriticality for Skaerbaek and Nordiylland	Modern Power Systems	March	1995
7	Al Taweelah B	Modern Power Systems Supplement	July	1995
8	A 500 MW Coal Fired CHP Plant for Rostok	Modern Power Systems Supplement	February	1992
9	World Digest	Modern Power Systems	September	1996
10	Advanced coal fired technology for Meri-Pori	Modern Power Systems - Supplement	March	1993
11	French Coal Expirience Leads to Technology Export	Modern Power Systems - Supplement	December	1991
12	World Digest	Modern Power Systems	March	1995
13	World Digest	Modern Power Systems	August	1996
14	World Digest	Modern Power Systems	January	1996
15	World Digest	Modern Power Systems	September	1995
16	Power Supply Outlook for the 1990s by P.J. Adams	1989 Power-Gen		
17	Development Plan for Advanced Fossil Fuel Power Plants	EPRI CS-4029	May	1985
18	Comparison of Options for Generating Electricity from Coal in California	Prepared for PG&E by Stearns Catalytic	December	1986
19	Advanced Power Systems and Coal Quality	IEA Coal Research, IEACR/87	May	1996

Figure 1

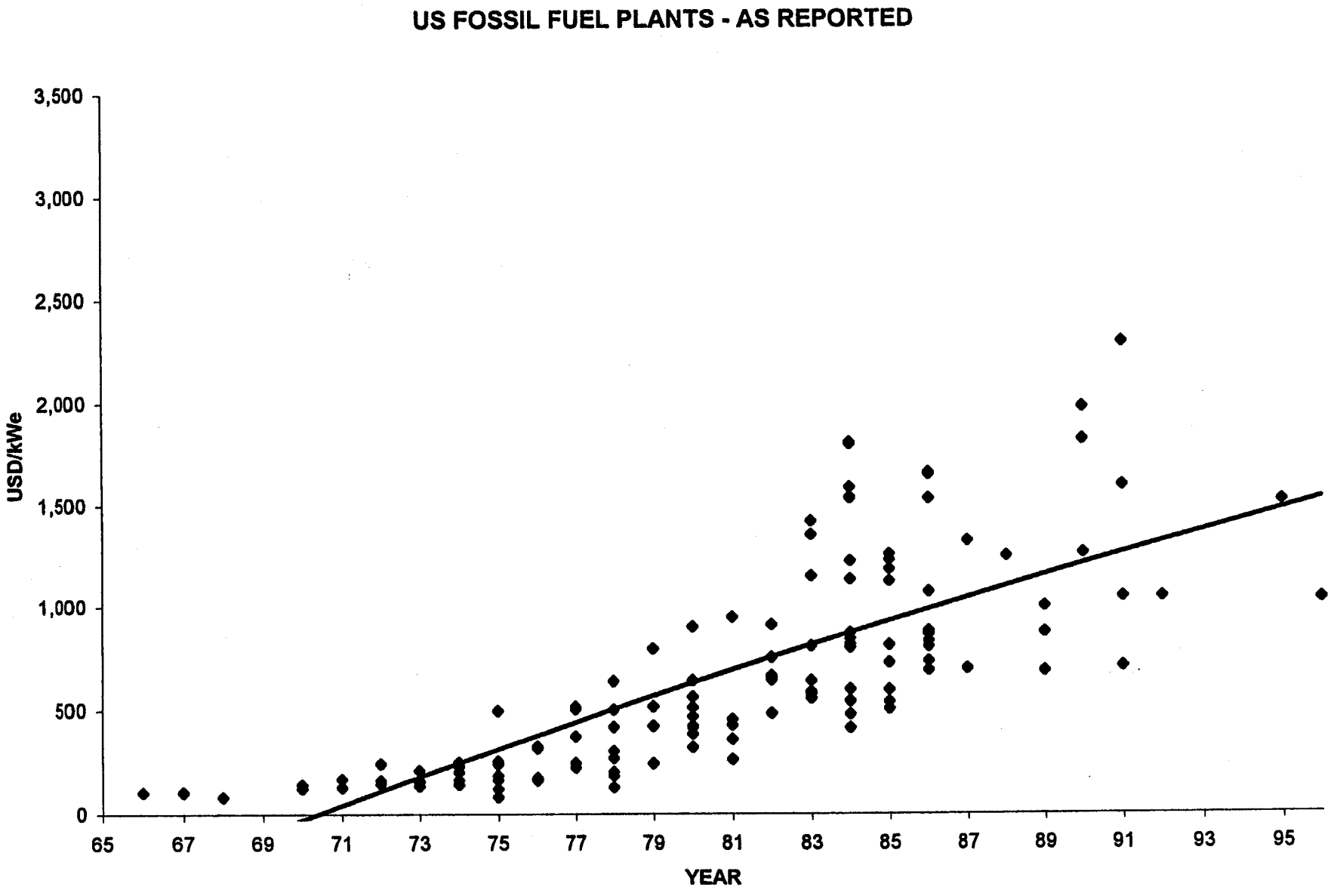

US FOSSIL FUEL PLANTS - AS REPORTED
USD/kWe
3,500
3,000
2,500
2,000
1,500
1,000
500
0
65
67
69
71
73
75
77
79
81
83
85
87
89
91
93
95
YEAR

Figure 2

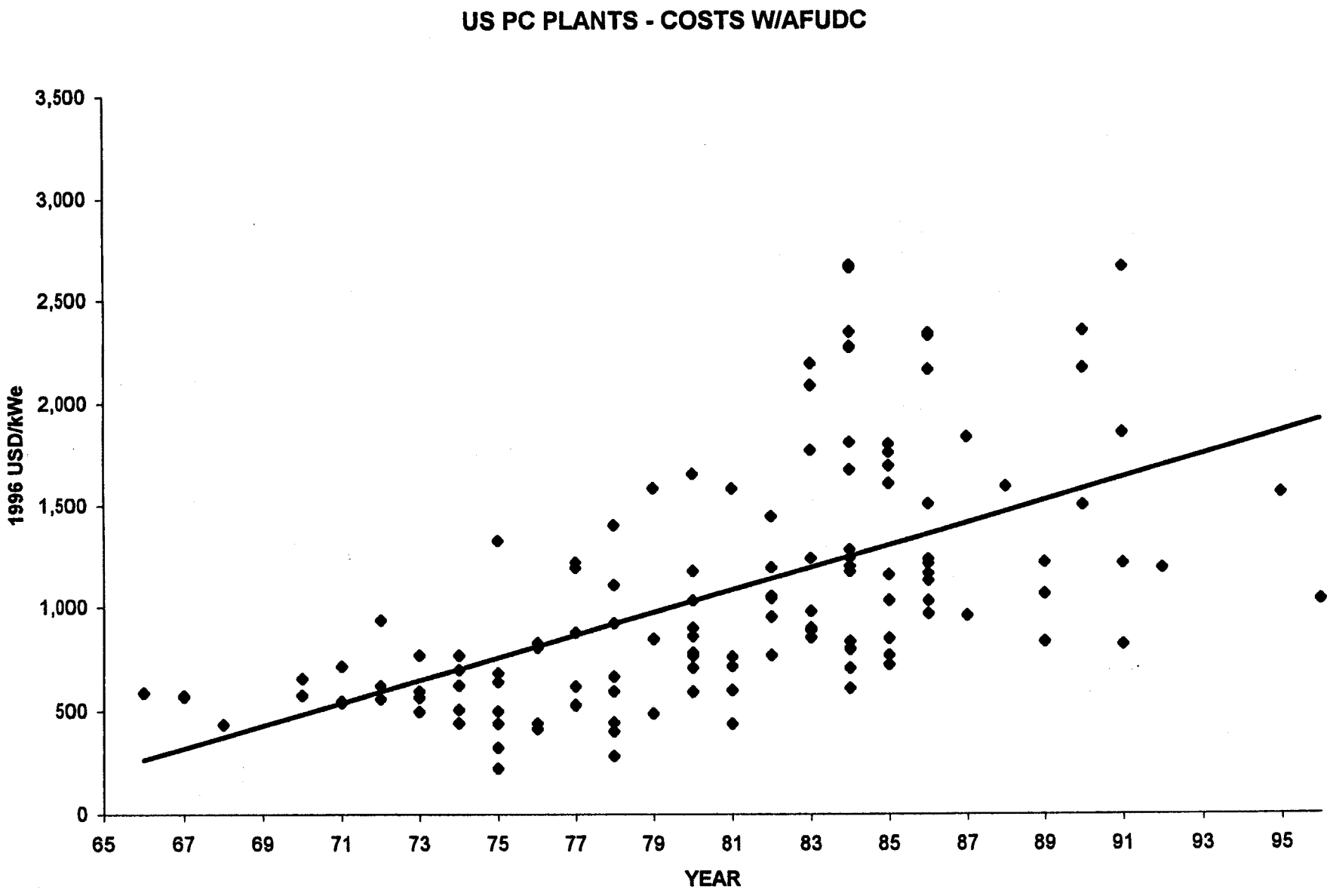

US PC PLANTS - COSTS W/AFUDC
1996 USD/kWe
3,500
3,000
2,500
2,000
1,500
1,000
500
0
65
67
69
71
73
75
77
79
81
83
85
87
89
91
93
95
YEAR

Figure 3

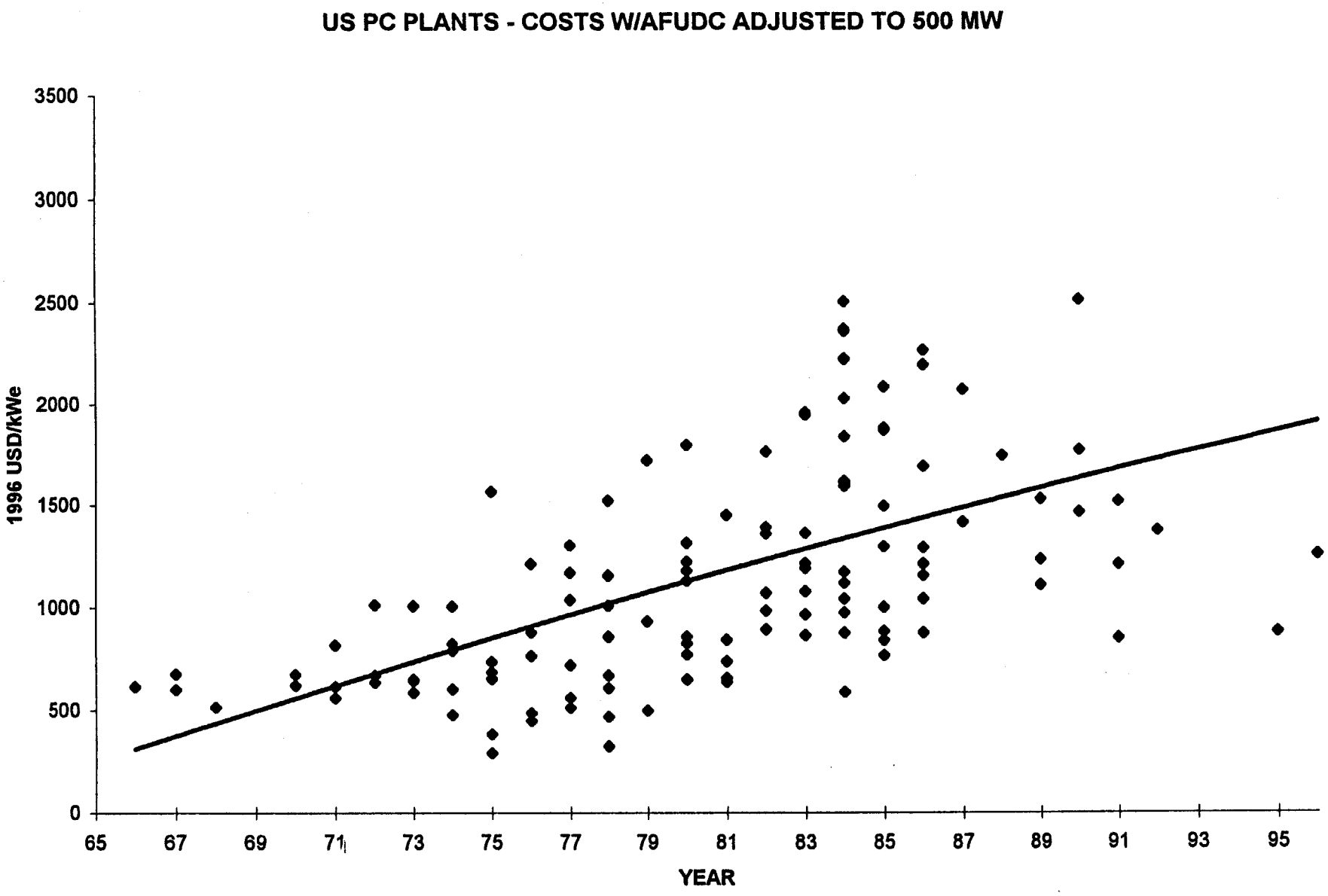

US PC PLANTS - COSTS W/AFUDC ADJUSTED TO 500 MW
1996 USD/kWe
3500
3000
2500
2000
1500
1000
500
0
65
67
69
71
73
75
77
79
81
83
85
87
89
91
93
95
YEAR

Figure 4

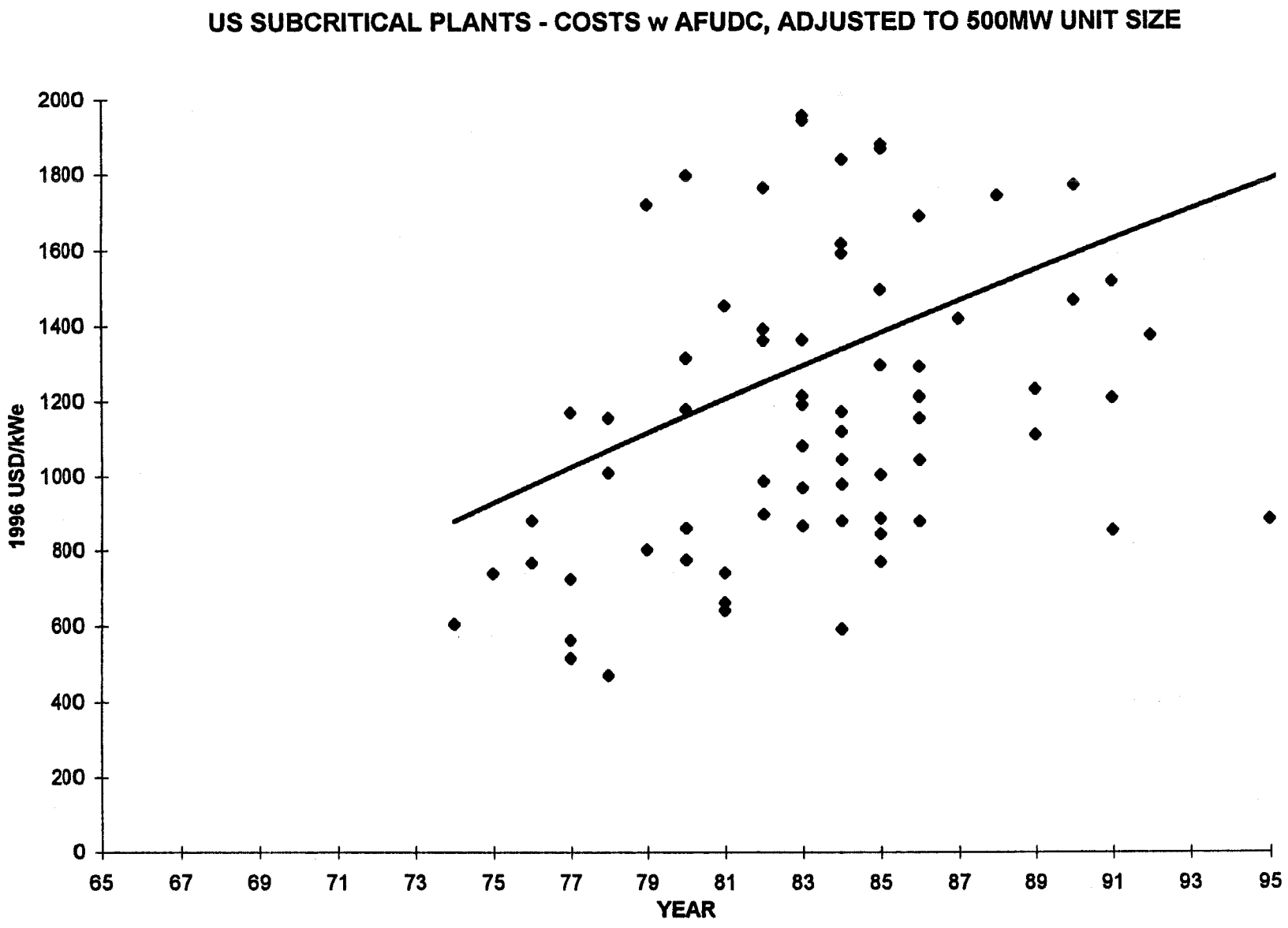

US SUBCRITICAL PLANTS - COSTS w AFUDC, ADJUSTED TO 500MW UNIT SIZE
1996 USD/kWe
2000
1800
1600
1400
1200
1000
800
600
400
200
0
65
67
69
71
73
75
77
79
81
83
85
87
89
91
93
95
YEAR

Figure 5

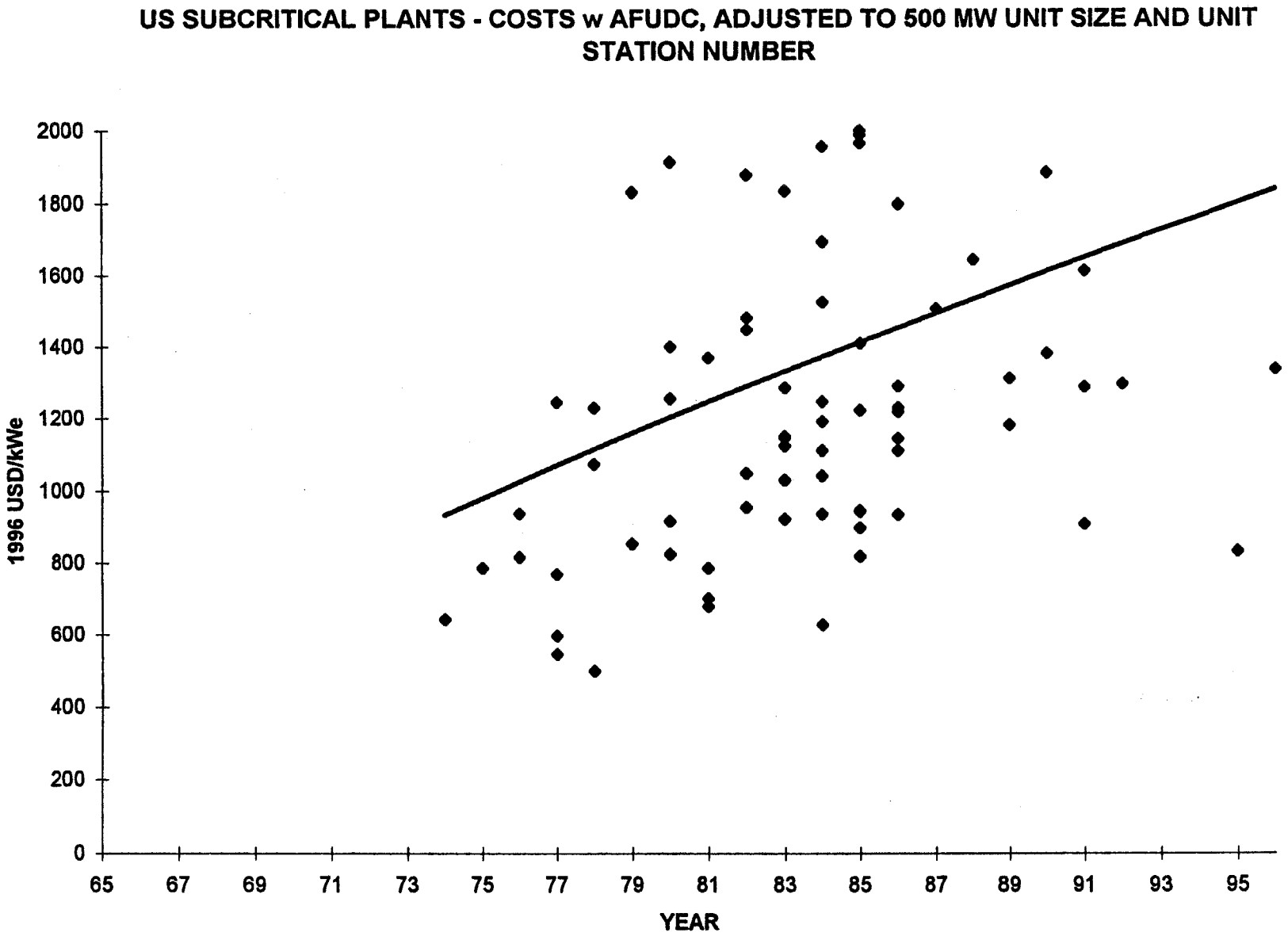

US SUBCRITICAL PLANTS - COSTS w AFUDC, ADJUSTED TO 500 MW UNIT SIZE AND UNIT STATION NUMBER
1996 USD/kWe
2000
1800
1600
1400
1200
1000
800
600
400
200
0
65
67
69
71
73
75
77
79
81
83
85
87
89
91
93
95
YEAR

Figure 6

US SUPERCRITICAL PLANTS - COSTS w AFDUC, ADJUSTED TO 500 MW UNIT SIZE

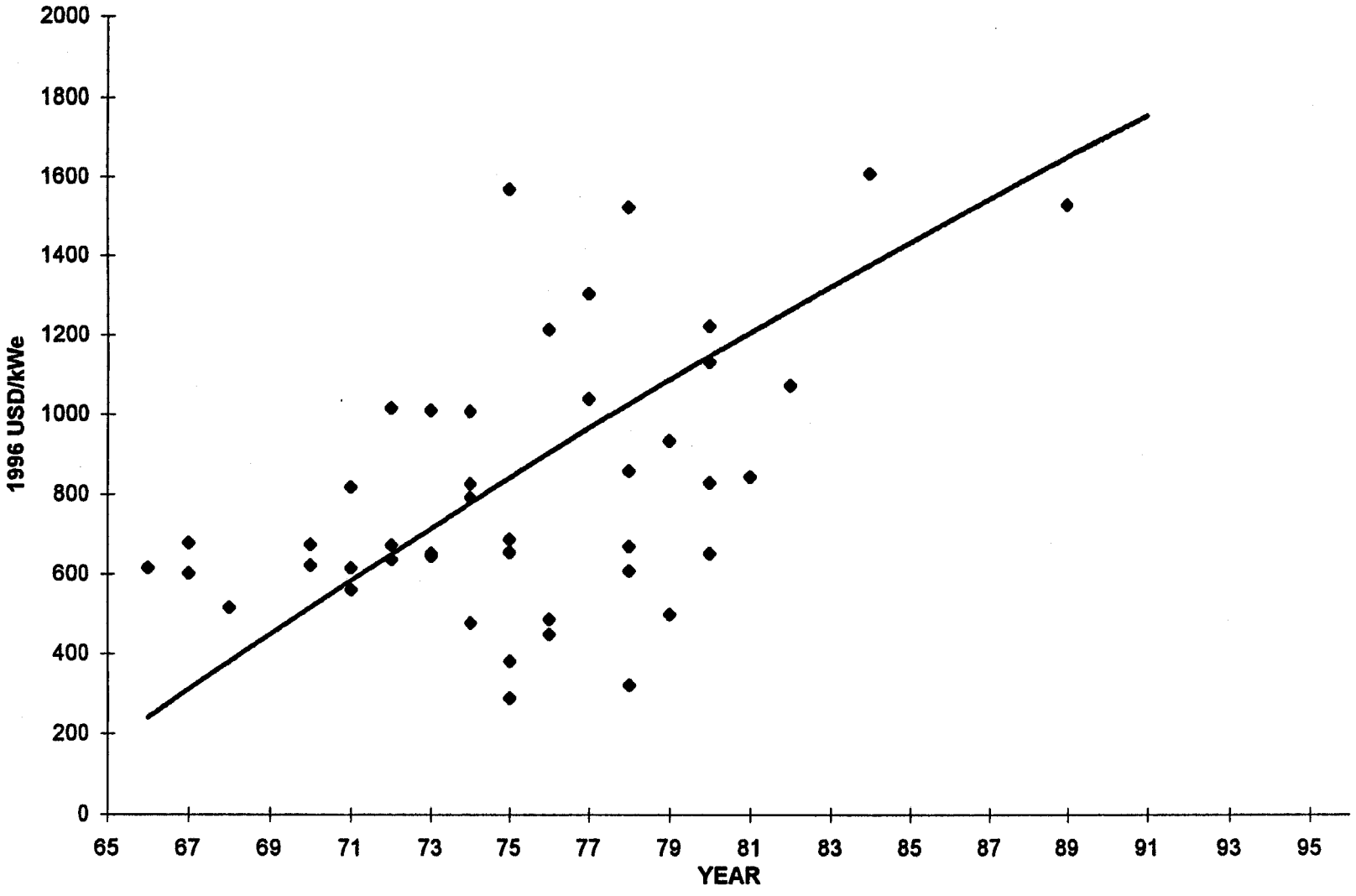


Figure 7

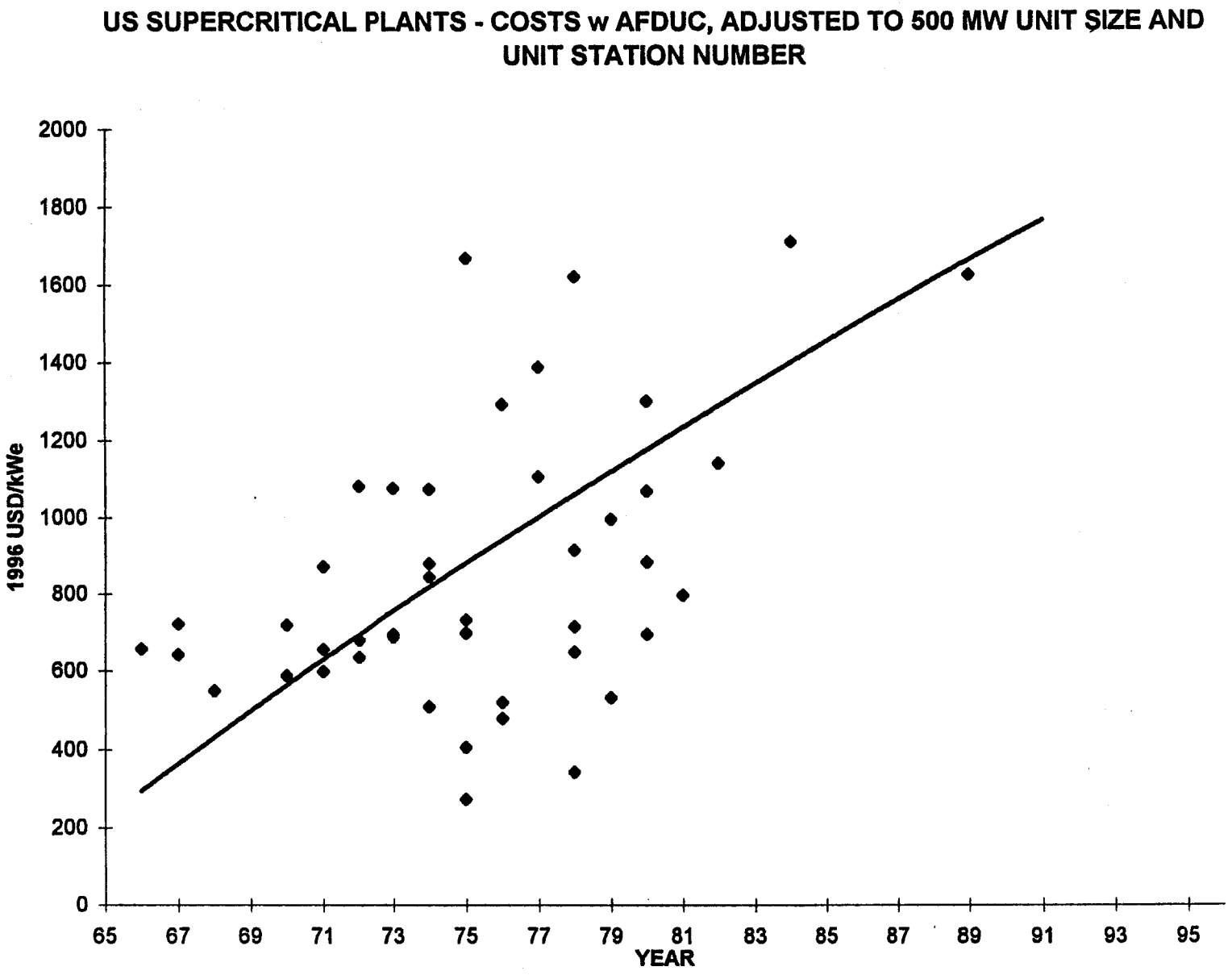

US SUPERCRITICAL PLANTS - COSTS w AFDUC, ADJUSTED TO 500 MW UNIT SIZE AND UNIT STATION NUMBER
1996 USD/kWe
2000
1800
1600
1400
1200
1000
800
600
400
200
0
65
67
69
71
73
75
77
79
81
83
85
87
89
91
93
95
YEAR

Figure 8

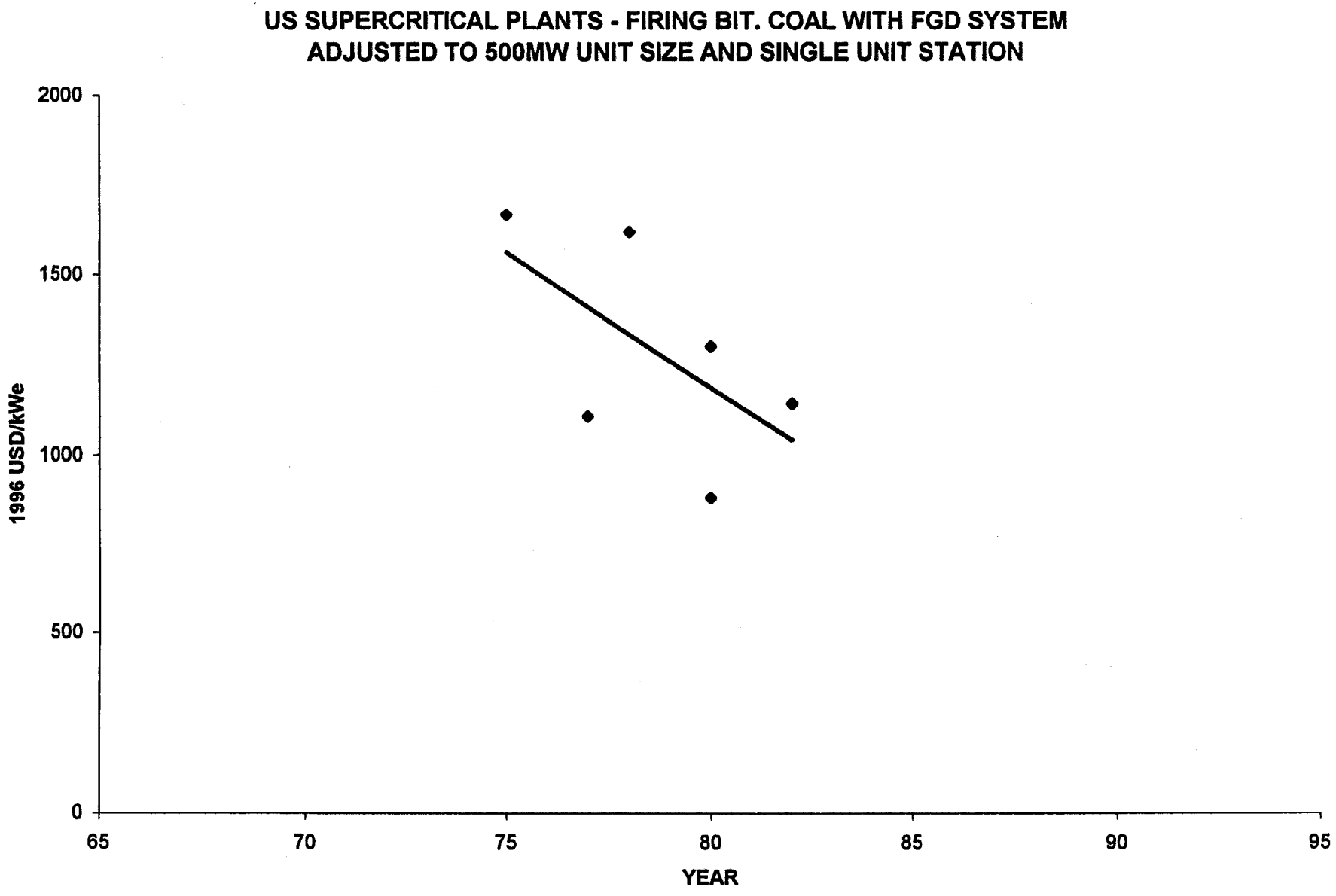

US SUPERCRITICAL PLANTS - FIRING BIT. COAL WITH FGD SYSTEM
ADJUSTED TO 500MW UNIT SIZE AND SINGLE UNIT STATION
2000
1500
1000
500
0
1996 USD/kWe
65
70
75
80
85
90
95
YEAR

Figure 9

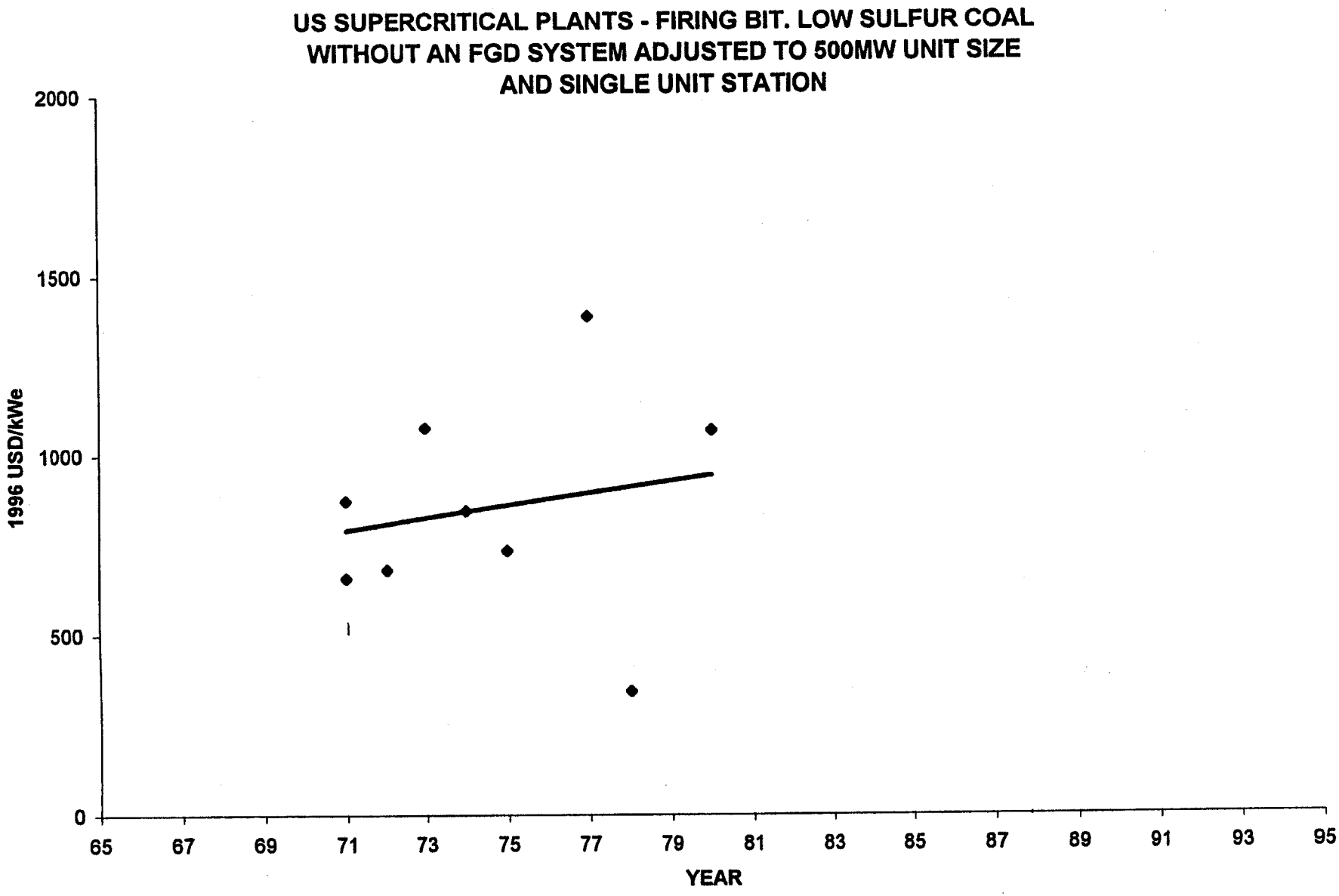

US SUPERCRITICAL PLANTS - FIRING BIT. LOW SULFUR COAL
WITHOUT AN FGD SYSTEM ADJUSTED TO 500MW UNIT SIZE
AND SINGLE UNIT STATION
1996 USD/kWe
2000
1500
1000
500
0
65
67
69
71
73
75
77
79
81
83
85
87
89
91
93
95
YEAR

Figure 10

US PC PLANTS COST HISTORY

500MW Avg.Unit Cost

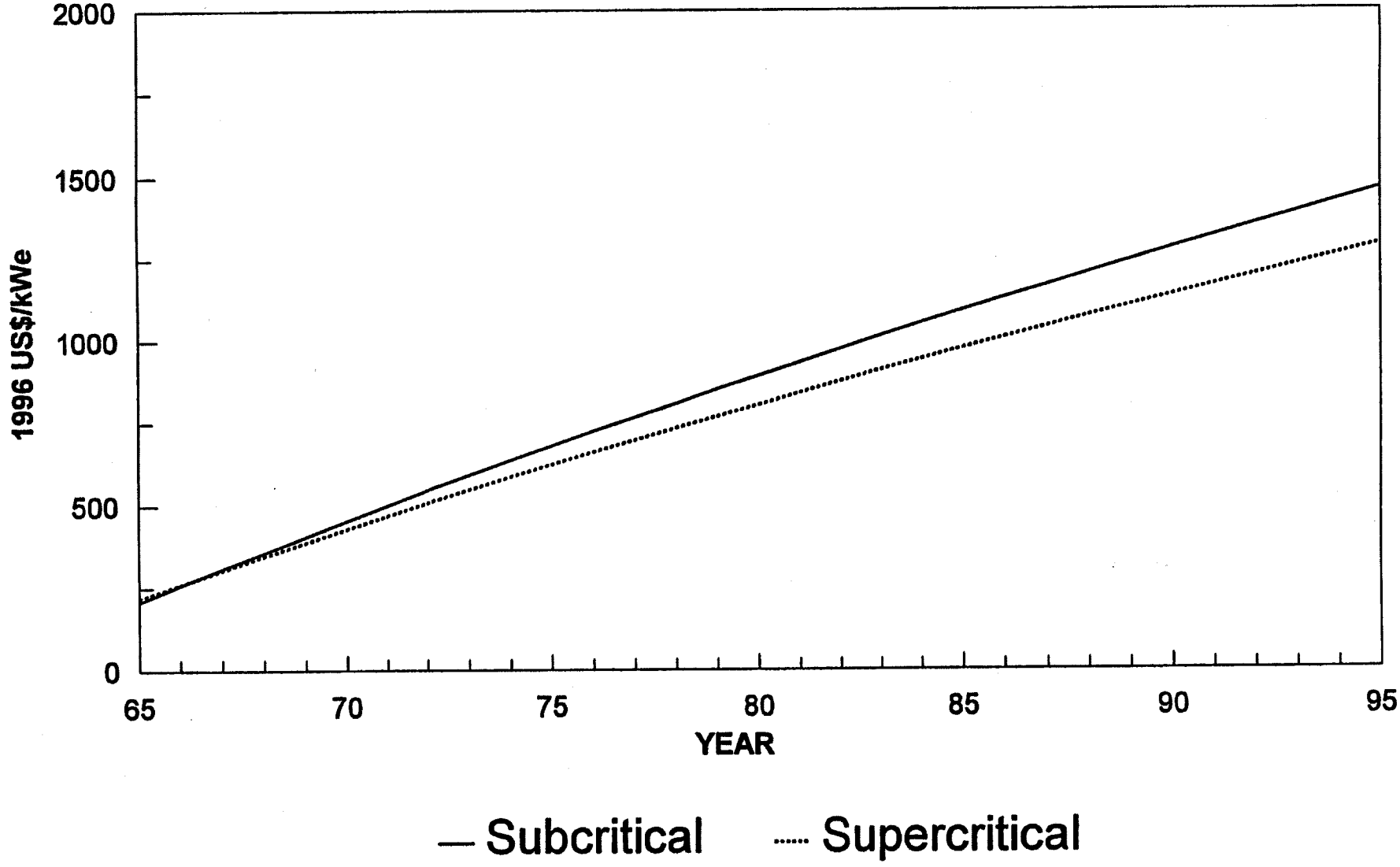


Figure 11

US PC PLANTS COST HISTORY

500MW Avg.Unit Cost

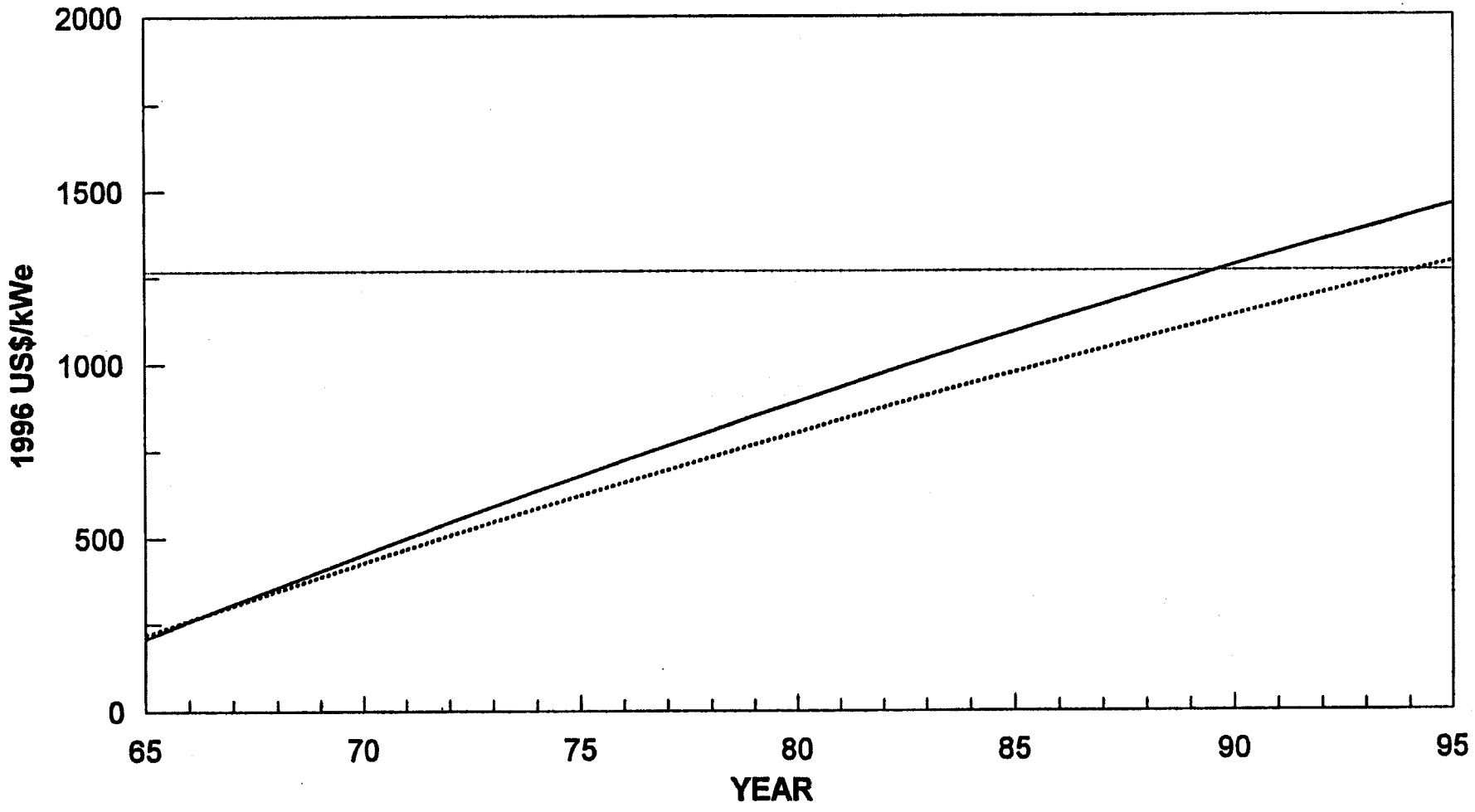


Figure 12

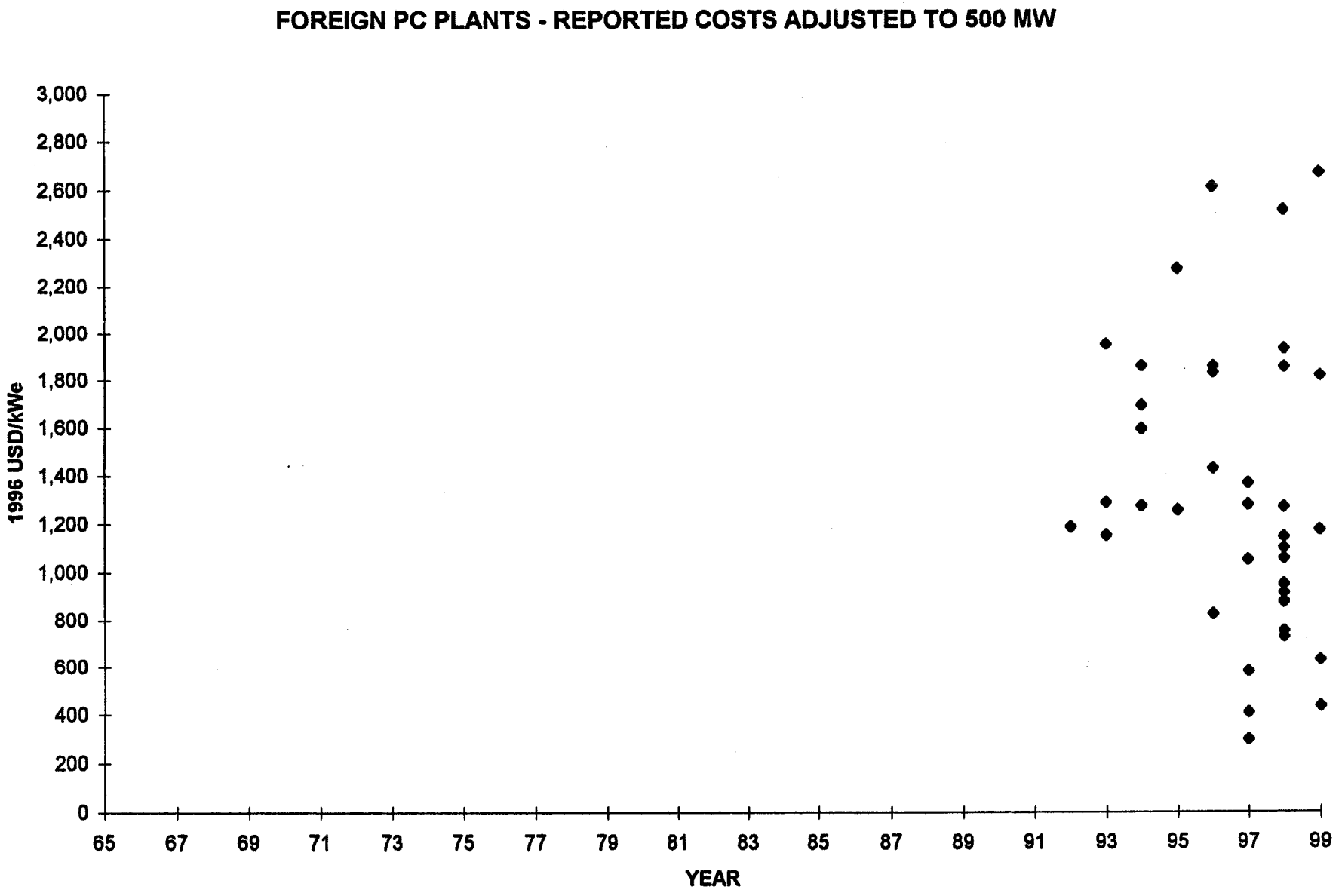
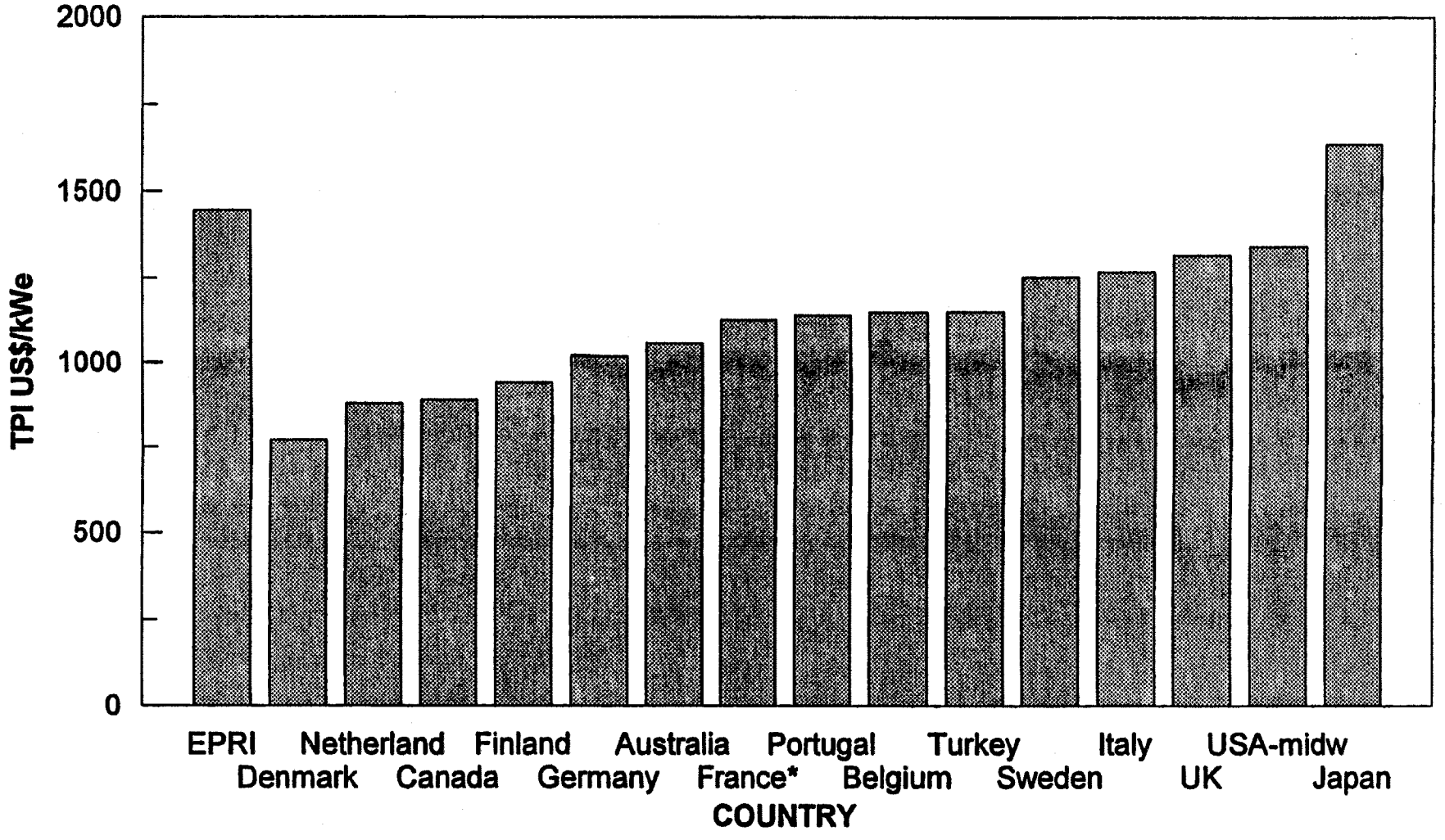

FOREIGN PC PLANTS - REPORTED COSTS ADJUSTED TO 500 MW
1996 USD/kWe
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
65
67
69
71
73
75
77
79
81
83
85
87
89
91
93
95
97
99
YEAR

Figure 13

INTERNATIONAL PC PLANT COSTS

Total Plant Investment - Discounted Cash Flow Basis



Data not normalized, except as 1996 $
Costs are estimates, except *=constructed

Figure 14

Regional Construction Labor Factors

Northeast	0.727802
Ohio River Valley	0.957854
Southeast	1.686341
Midwest	0.825764
Central	0.935454
South Central	1.347709
West Coast	0.809061
Northwest	0.94518
Hawaii	0.773395

APPENDIX B
ATMOSPHERIC FLUIDIZED BED COMBUSTORS

1.0 INTRODUCTION

This appendix includes data gathered on AFBC units. The objective of this exercise was to present the relationship between the development of the technology over time with respect to the capital cost. The relationship of technology maturity to price per kW could then be applied to the development of the clean coal technology presented in the main portion of this document.

This presentation of data on AFBC plants is based on information available from various sources. This information is a presentation of costs, plant components, and environmental controls; no attempt was made to develop operating costs for each of the plants. The Utility Data Institute, which provided a majority of the costing information, provides capital cost data in the year dollars the plant was constructed. There is no scope breakdown of the capital cost.

2.0 DATA

Cost data and unit size were gathered for AFBC's. Figure 1 shows the size of AFBC's built and the year of operation. Figure 2 presents the costs levelized to 1996 constant dollars. The cost data presented in Figure 2 include funds during construction.

Various attempts were made to normalize the data presented in Figure 2 to determine a predictable trend, rather than the scatter shown in Figure 2. Figures 3 and 4 segregate the data. Figure 3 shows all AFBC units between 20 and 100 MW, while Figure 4 shows all units greater than 100 MW. Figure 5 shows the capital cost of all AFBC units in 1996 constant dollars and normalized to a 1.0 labor factor, thereby eliminating regional workforce differences.

Further attempts were made to segregate the data. Figures 6 and 7 have the data normalized to two plant sizes; all facilities smaller than 100 MW were normalized to 50 MW, and all greater than 100 MW were normalized to 200 MW. The costs shown are levelized to 1996 constant dollars.

3.0 ANALYSIS

As previously stated, attempts were made to normalize all the data. Labor factors were utilized to equate the plant to a national average labor factor. Figure 8 presents the labor factors. All cost data gathered from published sources are in the year dollars that the plant came on line. These costs were escalated to 1996 constant dollars by use of the Handy-Whitman formula.

Figures 1 through 7 show scatter plots; there is no definite trend presented in the costs of building AFBC units even though we know the price of the components has decreased over time. Therefore, it was expected that the plots would have shown decreasing plant costs as the technology became commercially available and proven. The fact that no relationship is shown in the plots indicates that the site-specific components, environmental regulations, and the scope of work included in the cost numbers reported are a major influence.

Plant costs are dependent on technology, time frame, and site. Increasing environmental regulations will cause more expensive permitting, which may or may not have been included in the presented costs. The time frame in which the plant was built could have a significant impact on the capital cost, and the use of union or nonunion labor will also have a significant impact. The location in which the plant is built could also have a significant impact other than the labor rate, which we have normalized, because construction techniques differ depending upon the region. In the South, structures may be left open, and neither heat tracing nor train thawing is required. However, in the North, structures are enclosed, and the facility requires more insulation, as well as heat tracing or freeze protection. In addition, cogeneration steam may be produced by these facilities, thus decreasing the reported energy output.

The most significant factor influencing the data presented herein is the scope of the costs reported. We have no way of equalizing all costs reported to include similar items. Permitting and licensing may or may not be included. Civil amenities (e.g., fence, road, railway, geotechnical liners, etc.) may or may not be included. Byproduct (e.g., boiler slag, fly ash) disposal areas may or may not be included. A second unit on an existing site will have lower capital costs reported, due to site facilities already being in place.

4.0 CONCLUSION

The data presented are capital cost data, with little supporting information. All attempts at normalizing or levelizing the data to get a true trend analysis failed. The data are historical, which provides relationships between data points; however, to get a true trend of the development of one of the first clean coal technologies to commercialize, more information is required. The relationship between technology maturity and capital cost was not shown in the data gathered.

Figure 1

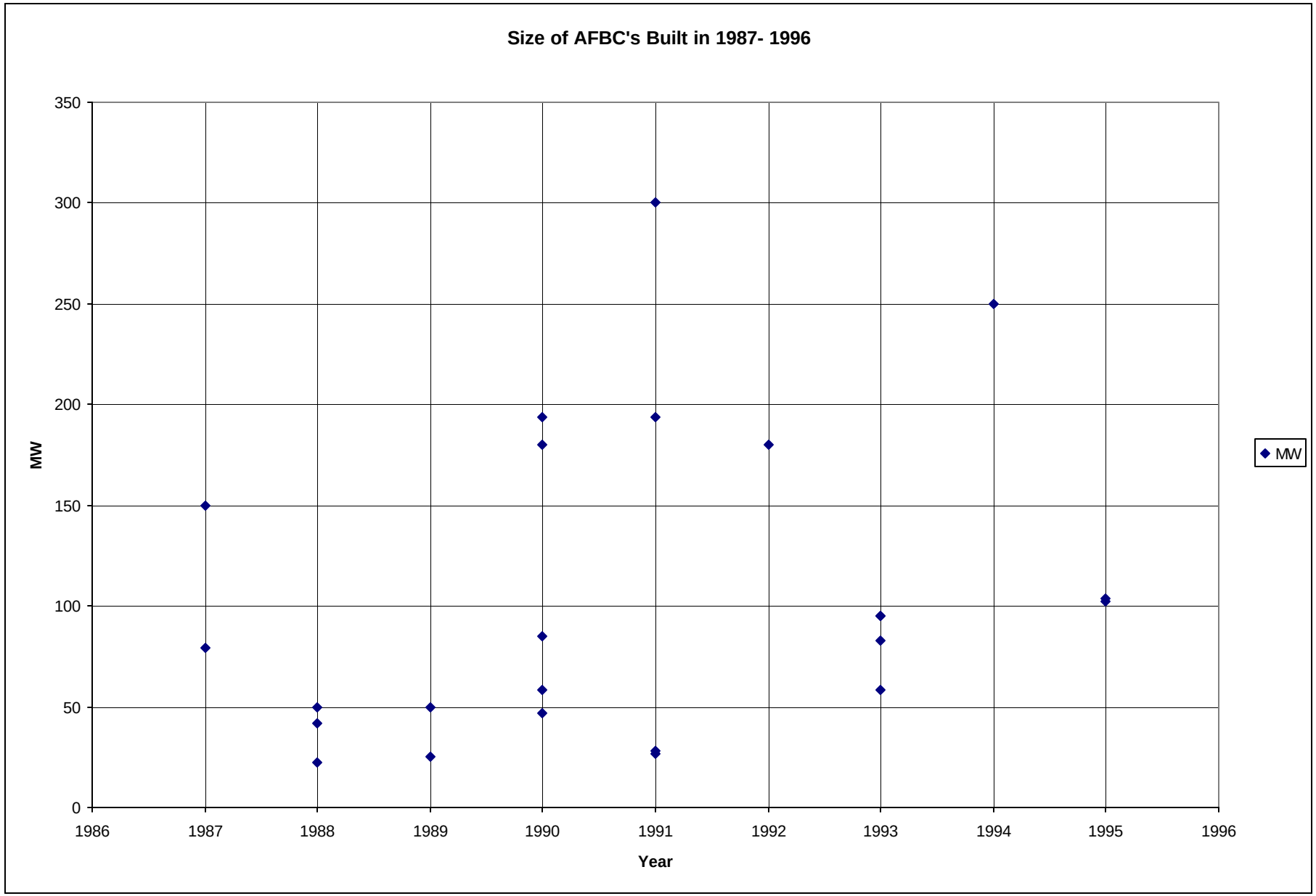

Size of AFBC's Built in 1987- 1996
MW
350
300
250
200
150
100
50
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Year
MW

Figure 2

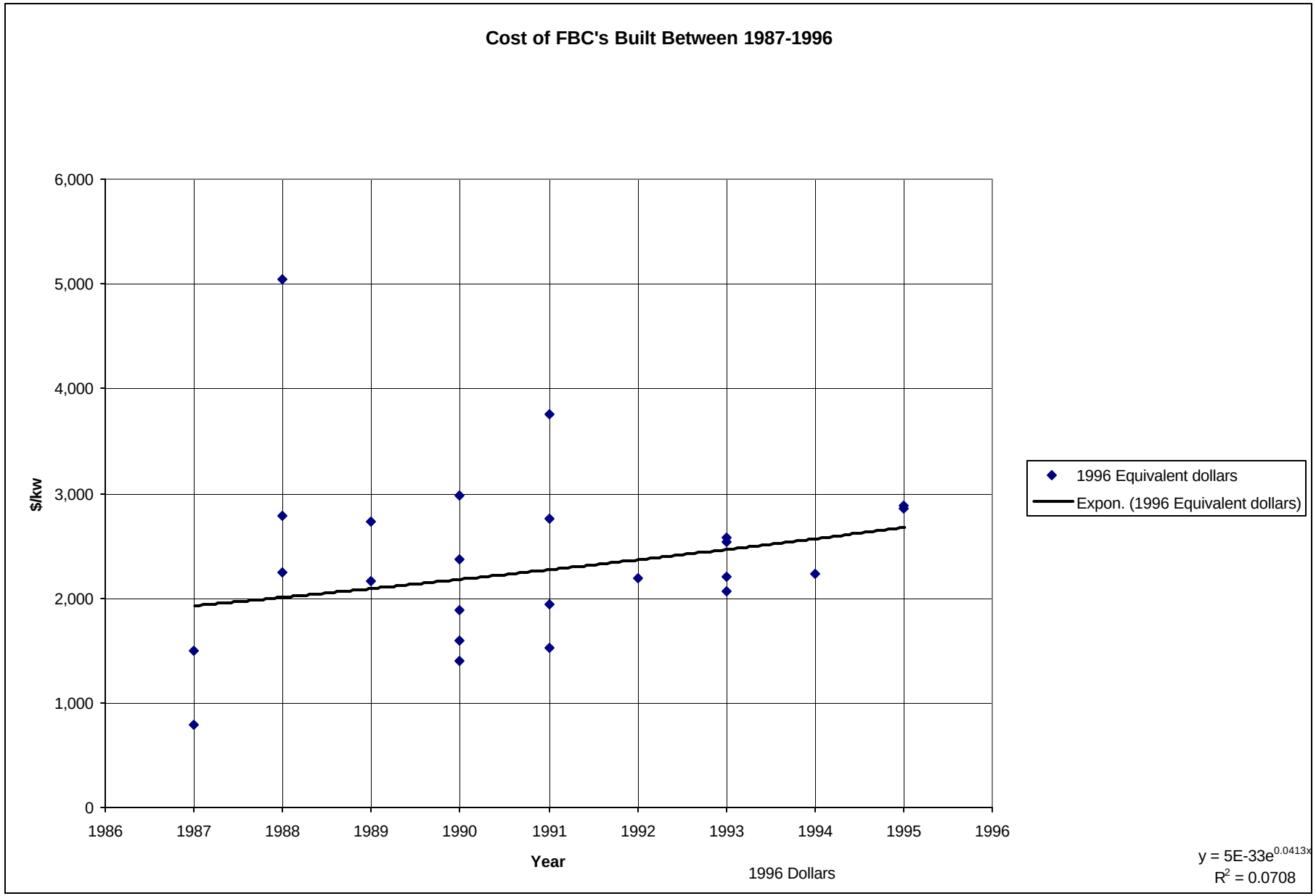

Cost of FBC's Built Between 1987-1996
6,000
5,000
4,000
3,000
2,000
1,000
0
$/kw
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Year
1996 Dollars
1996 Equivalent dollars
Expon. (1996 Equivalent dollars)
y = 5E-33e^0.0413x
R^2 = 0.0708

Figure 3

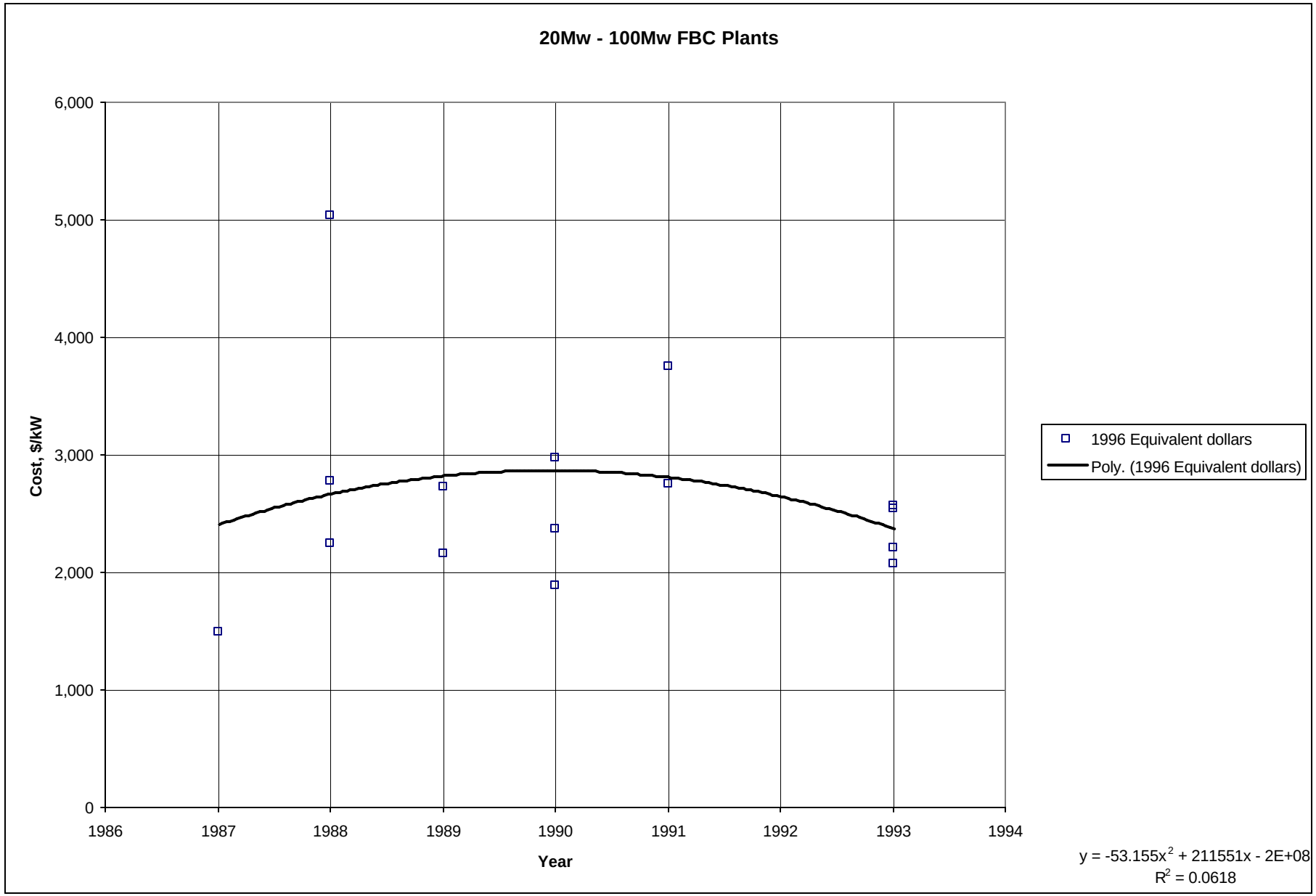

20Mw - 100Mw FBC Plants
6,000
5,000
4,000
3,000
2,000
1,000
0
Cost, $/kW
1986
1987
1988
1989
1990
1991
1992
1993
1994
Year
1996 Equivalent dollars
Poly. (1996 Equivalent dollars)
y = -53.155x2 + 211551x - 2E+08
R2 = 0.0618

Figure 4

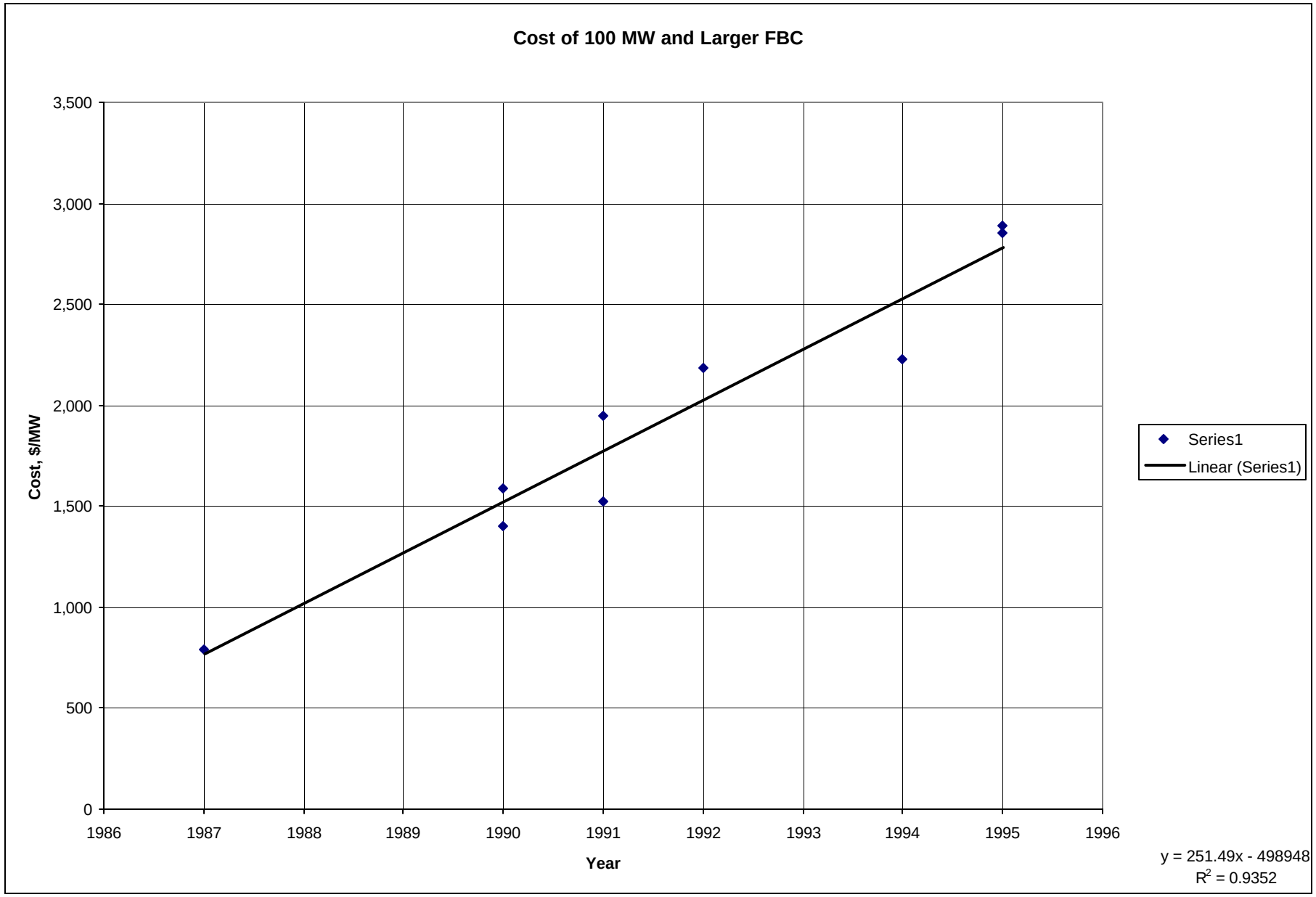

Cost of 100 MW and Larger FBC
Cost, $/MW
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Year
Series1
Linear (Series1)
y = 251.49x - 498948
R2 = 0.9352

Figure 5

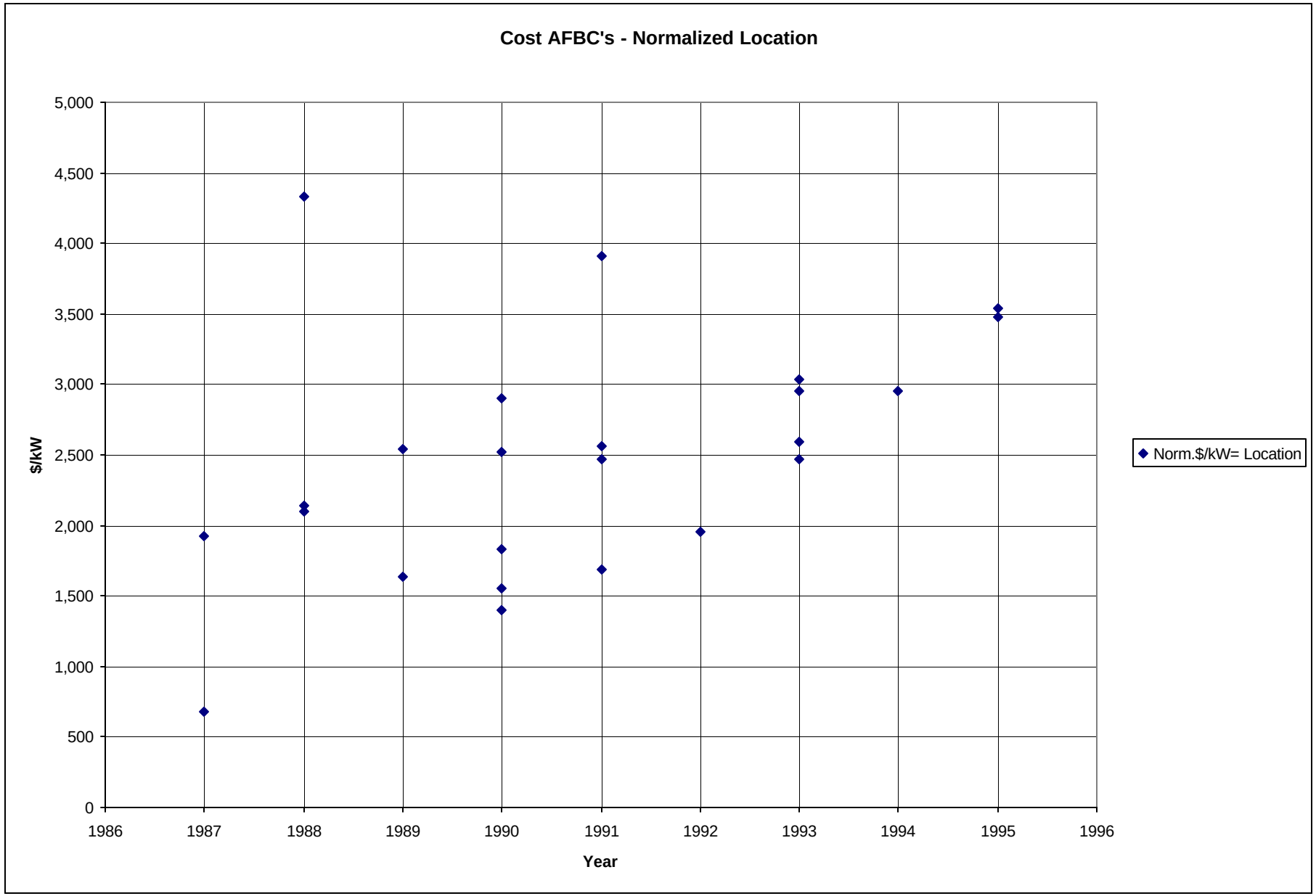

Cost AFBC's - Normalized Location
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
$/kW
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Year
Norm.$/kW= Location

Figure 6

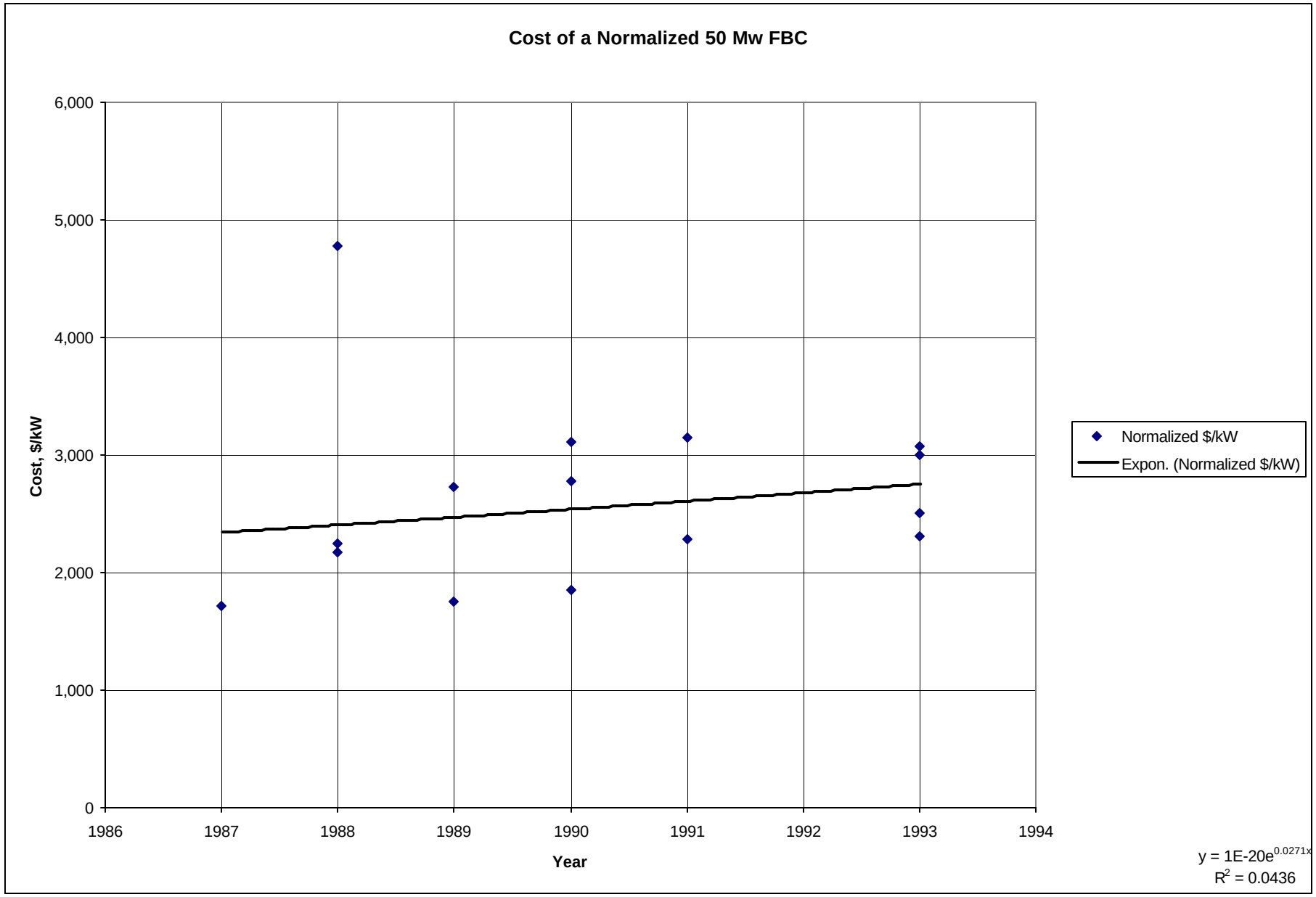

Cost of a Normalized 50 Mw FBC
6,000
5,000
4,000
3,000
2,000
1,000
0
Cost, $/kW
1986
1987
1988
1989
1990
1991
1992
1993
1994
Year
Normalized $/kW
Expon. (Normalized $/kW)
y = 1E-20e^0.0271x
R^2 = 0.0436

Figure 7

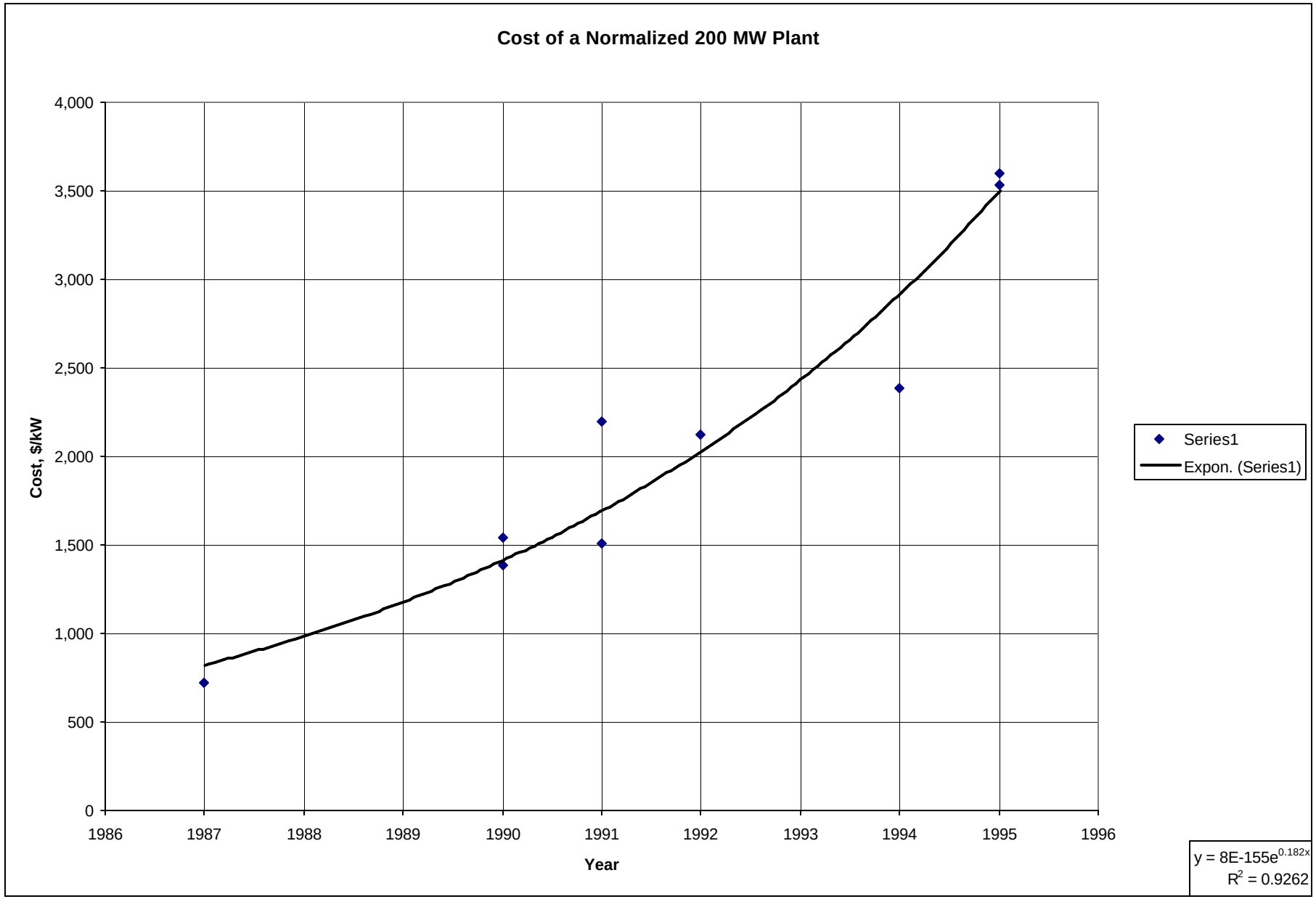

Cost of a Normalized 200 MW Plant
Cost, $/kW
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Year
Series1
Expon. (Series1)
y = 8E-155e^0.182x
R^2 = 0.9262

Figure 8

REGIONAL CONSTRUCTION LABOR FACTORS

Northeast	0.727802
Ohio River Valley	0.957854
Southeast	1.686341
Midwest	0.825764
Central	0.935454
South Central	1.347709
West Coast	0.809061
Northwest	0.94518
Hawaii	0.773395

APPENDIX C
NATURAL GAS COMBINED CYCLE UNITS

1.0 INTRODUCTION

This appendix includes data gathered on natural gas turbine combined cycle units. The objective of this exercise was to present the relationship between the development of the technology over time with respect to the capital cost. The relationship of technology maturity to price per kW could then be applied to the development of the clean coal technology presented in the main portion of this document.

This presentation of data on natural gas turbine combined cycle plants is based on information available from various sources. No attempt was made in this study to develop operating costs. The Utility Data Institute, which provided a majority of the costing information, provides capital cost data in the year dollars the plant was constructed. There is no scope breakdown of the capital cost.

2.0 DATA

Cost data for natural gas turbine combined cycle facilities were gathered from various sources. Figure 1 presents these costs for all gas turbine combined cycle facilities, regardless of size, levelized to 1996 constant dollars and a 1.0 labor factor.

Various attempts were made to normalize the data presented in Figure 1 to determine a predictable trend, rather than the scatter shown in Figure 1. Figure 2 shows the cost of the facility in relation to the year it was built. The data are levelized to 1996 constant dollars and a 1.0 labor factor.

Further attempts were made to segregate the data. Many gas turbine facilities are built on sites that currently have a power-producing turbine (gas, coal or oil) where the infrastructure facilities already exist. The cost of these facilities is deceivingly low because the reported costs do not include a complete facility. Figure 3 presents natural gas combined cycle facilities between 0 and 50 MWe, built on greenfield plant sites. The costs are levelized to 1996 constant dollars and a

1.0 labor factor. This figure shows the year the plant was built versus the cost of the facility. Figure 4 presents natural gas combined cycle facilities between 50 and 100 MWe, built on greenfield plant sites. The costs are levelized to 1996 constant dollars and a 1.0 labor factor. This figure shows the year the plant was built versus the cost of the facility. Figure 5 presents the natural gas combined cycle facilities between 100 and 150 MWe, built on greenfield sights. The costs are levelized to 1996 constant dollars and a 1.0 labor factor. This figure shows the year the plant was built versus the cost of the facility. Figure 6 presents natural gas combined cycle facilities between 150 and 250 MWe, built on greenfield plant sites. The costs are levelized to 1996 constant dollars and a 1.0 labor factor. This figure shows the year the plant was built versus the cost of the facility. Figure 7 presents natural gas combined cycle facilities larger than 250 MWe, built on greenfield plant sites. The costs are levelized to 1996 constant dollars and a 1.0 labor factor. This figure shows the year the plant was built versus the cost of the facility.

Figure 8 presents data for natural gas combined cycle facilities between 0 and 50 MWe that were built as an extension to an existing facility. . The costs are levelized to 1996 constant dollars and a 1.0 labor factor. This figure shows the year the plant was built versus the cost of the facility. Figure 9 presents data for natural gas combined cycle facilities between 50 and 100 MWe that were built as an extension to an existing facility. The costs are levelized to 1996 constant dollars and a 1.0 labor factor. This figure shows the year the plant was built versus the cost of the facility. Figure 10 presents data for natural gas combined cycle facilities between 100 and 150 MWe that were built as an extension to an existing facility. The costs are levelized to 1996 constant dollars and a 1.0 labor factor. This figure shows the year the plant was built versus the cost of the facility. Figure 11 presents data for natural gas combined cycle facilities between 150 and 200 MWe that were built as an extension to an existing facility. The costs are levelized to 1996 constant dollars and a 1.0 labor factor. This figure shows the year the plant was built versus the cost of the facility. Figure 12 presents data for natural gas combined cycle facilities larger than 250 MWe that were built as an extension to an existing facility. The costs are levelized to 1996 constant dollars and a 1.0 labor factor. This figure shows the year the plant was built versus the cost of the facility.

Figure 13 exhibits the labor cost factor by region of the United States. This figure illustrates the differences in the labor rate depending on the region. Information from Figure 13 was used to adjust all costs presented to the national average or a 1.0 labor cost factor.

3.0 ANALYSIS

As previously stated, attempts were made to normalize all the data. To normalize for the region that the plant was built in, the labor factors presented in Figure 13 were utilized to equate the plant to a national average labor factor. All cost data gathered from published sources are in the year dollars that the plant came on line. These costs were escalated to 1996 constant dollars by use of the Handy-Whitman formula.

Figures 6 and 7 show a correlation between plant size and cost. Notice the Y-axis on Figures 6 and 7 has smaller scales than those on the previous two plots. Figures 8 through 12 also have significantly lower costs than those shown in Figures 4 through 7. This is due to the fact that the facility infrastructure, the incoming water, the wastewater treatment, the administration buildings, compressed gases, etc. are already provided with the existing facility.

Plant costs are dependent on technology, time frame, and site. Increasing environmental regulations cause plants to add more equipment (e.g., NOx injection and possibly SCR systems), lose potential capacity, and lose efficiency. Advanced technologies may have a higher capital cost, and be incorporated into the facility. These technologies will reduce operating costs, thereby reducing production costs; however, the data presented herein are solely a presentation of capital costs. The gas turbine that was used will have an effect on the capital cost. The time frame in which the plant was built could have a significant impact on the capital cost, and the use of union or nonunion labor will also have a significant impact. The location in which the plant is built could also have a significant impact other than the labor rate, which we have normalized, because construction techniques differ depending upon the region. In the South, structures may be left open, and heat tracing is not required. However, in the North, structures are enclosed, and the facility requires more insulation, as well as heat tracing or freeze protection.

The most significant factor influencing the data presented herein is the scope of the costs reported. We have no way of equalizing all costs reported to include similar items. Permitting and licensing may or may not be included. Civil amenities (e.g., fence, road, railway, geotechnical liners, etc.) may or may not be included.

Limited historical information was available for the international units. Most of the data presented are cost estimated data for current or future construction.

4.0 CONCLUSION

The data presented are capital cost data, with little supporting information. All attempts at normalizing or levelizing the data to get a true trend analysis failed. The data are historical, which provides relationships between data points; however, to get a true concept of the power plant development of the last seven years, more information is required. The relationship between technology maturity and capital cost was not shown in the data gathered.

Figure 1

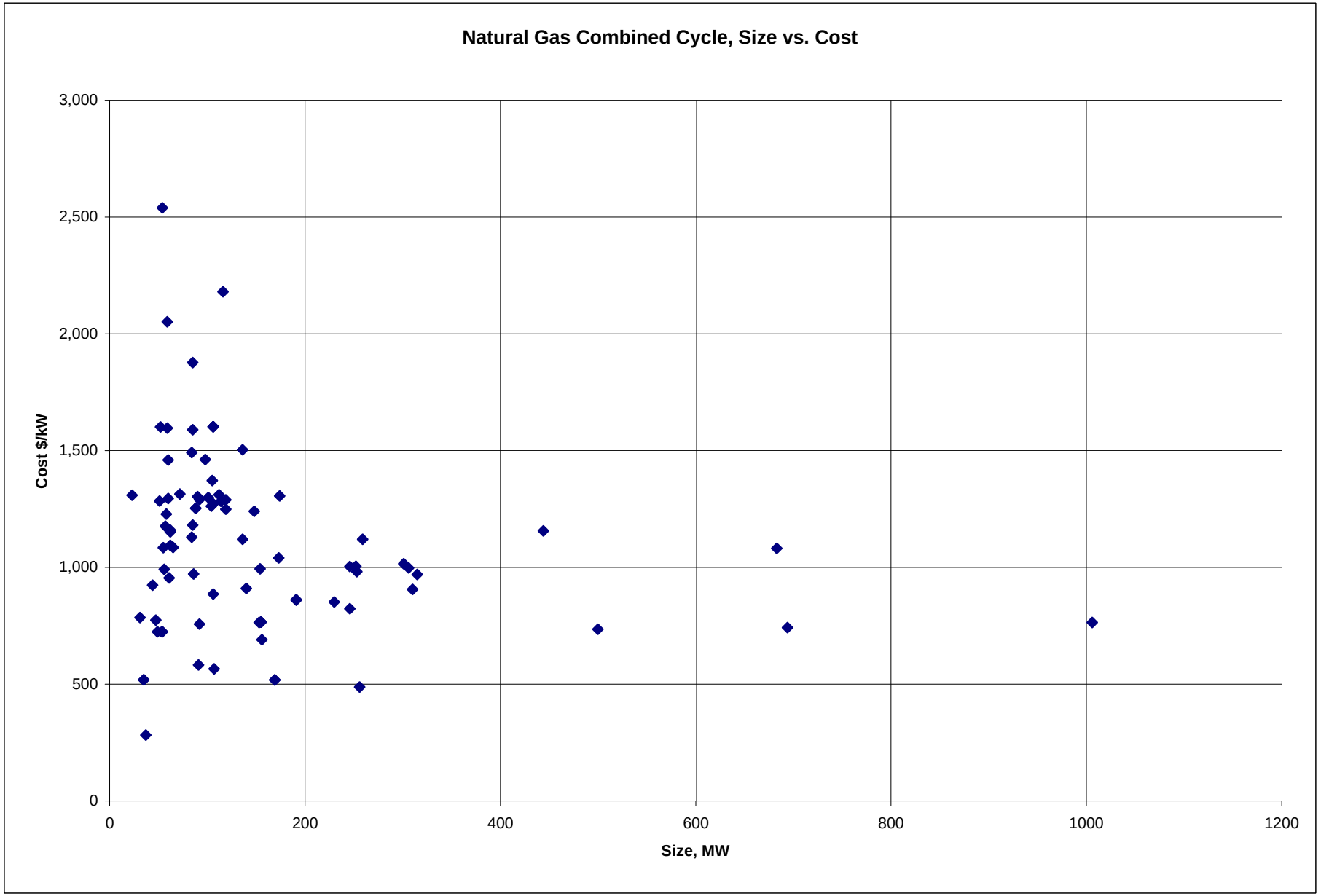

Natural Gas Combined Cycle, Size vs. Cost
Cost $/kW
3,000
2,500
2,000
1,500
1,000
500
0
0
200
400
600
800
1000
1200
Size, MW

Figure 2

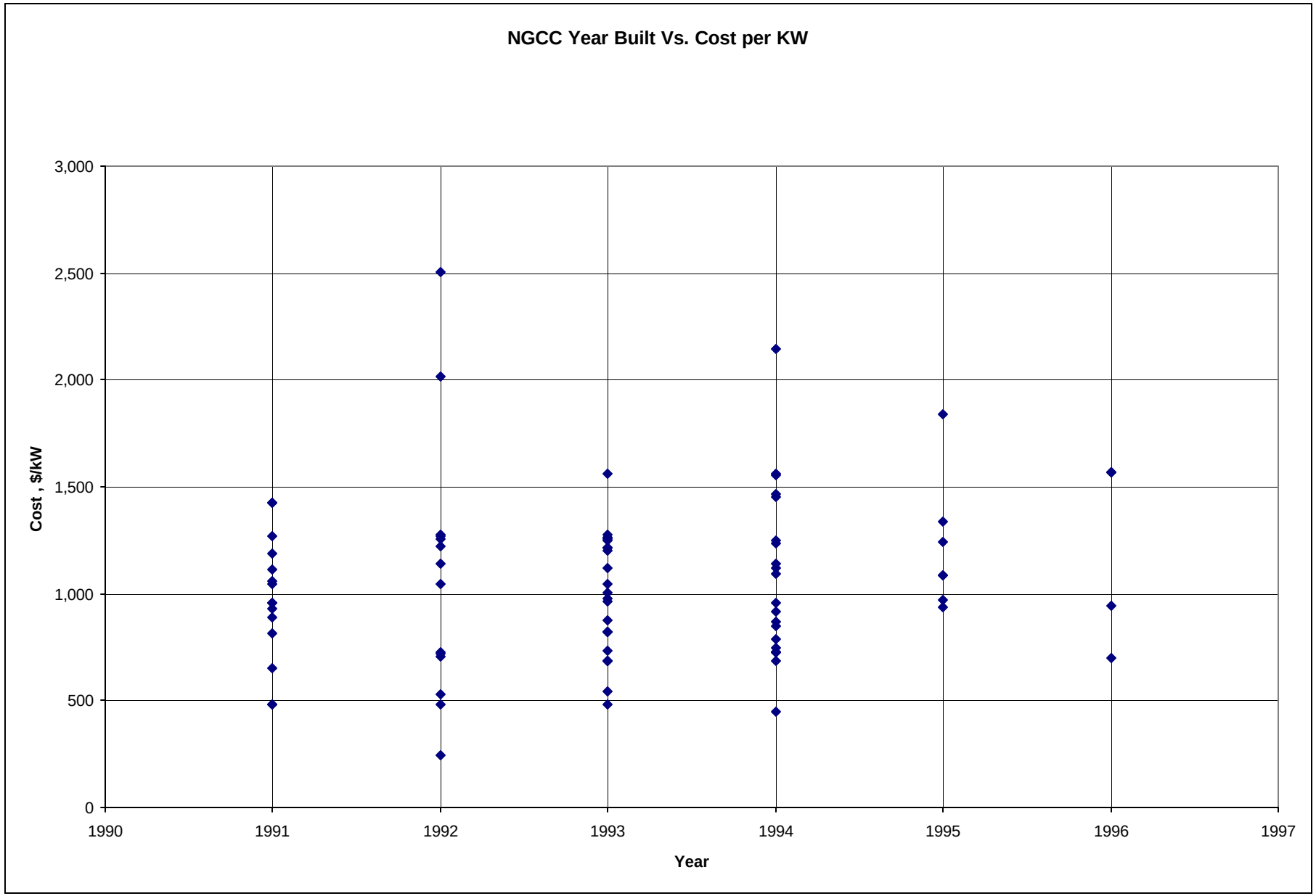

NGCC Year Built Vs. Cost per KW
Cost , $/kW
3,000
2,500
2,000
1,500
1,000
500
0
1990
1991
1992
1993
1994
1995
1996
1997
Year

Figure 3

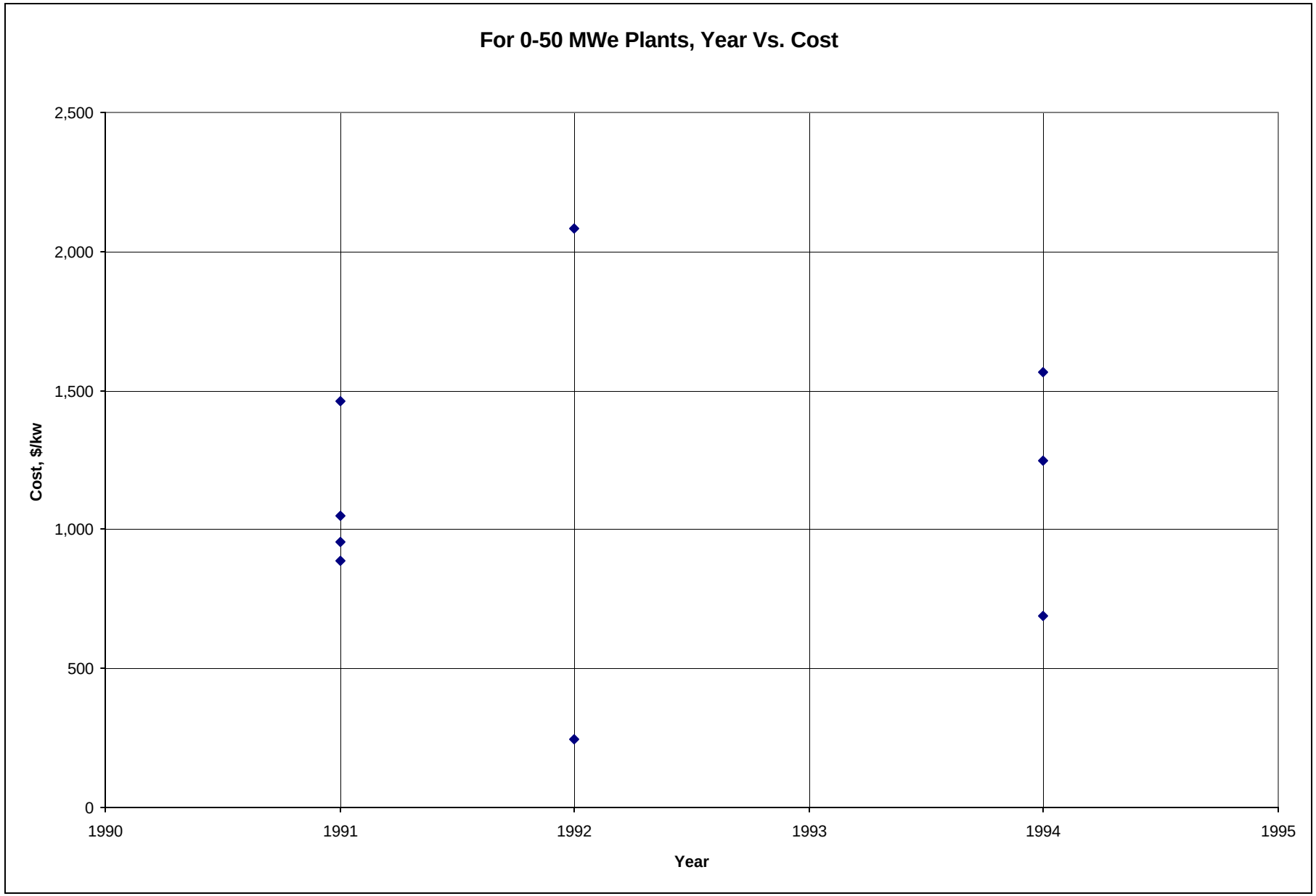

For 0-50 MWe Plants, Year Vs. Cost
2,500
2,000
1,500
1,000
500
0
Cost, $/kw
1990
1991
1992
1993
1994
1995
Year

Figure 4

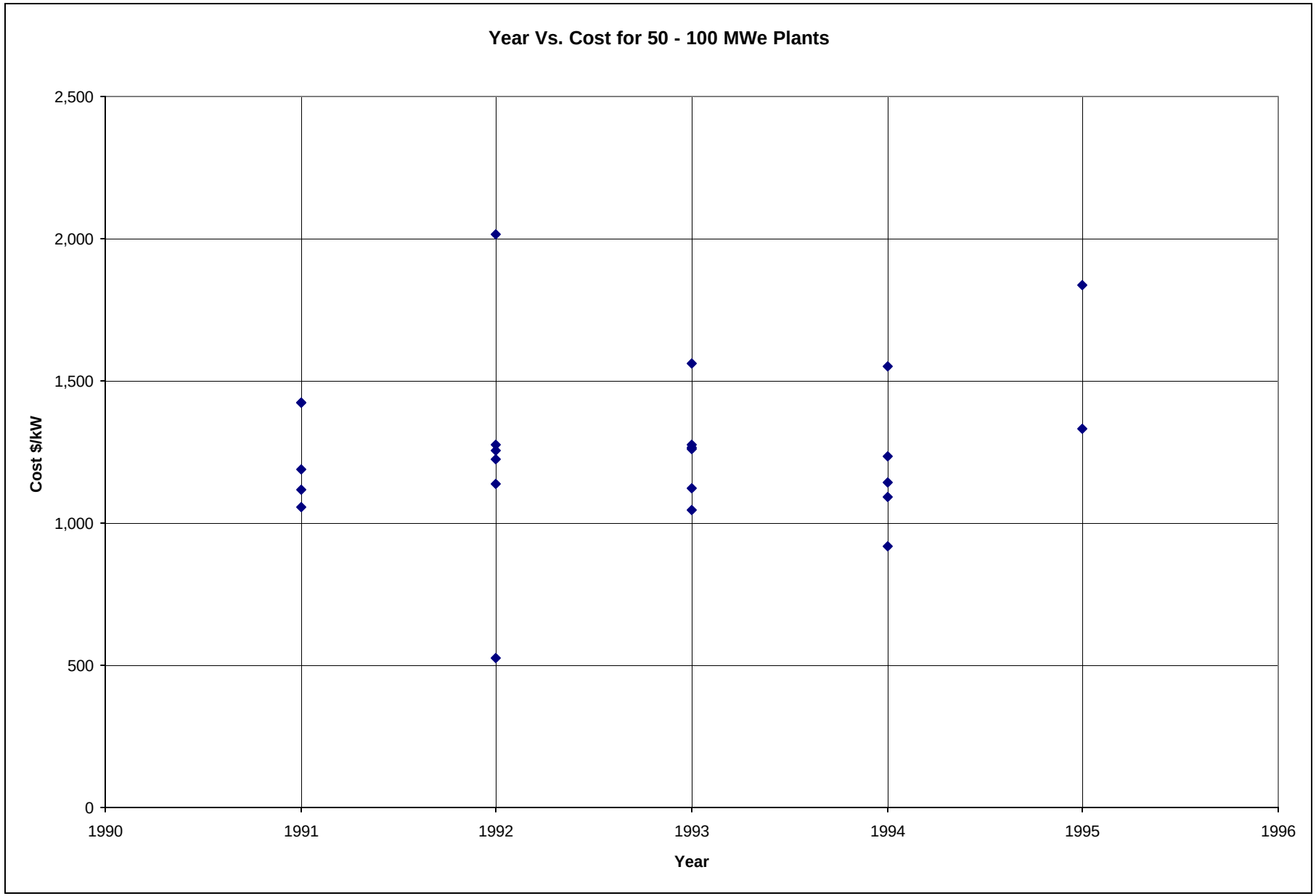

Year Vs. Cost for 50 - 100 MWe Plants
Cost $/kW
2,500
2,000
1,500
1,000
500
0
1990
1991
1992
1993
1994
1995
1996
Year

Figure 5

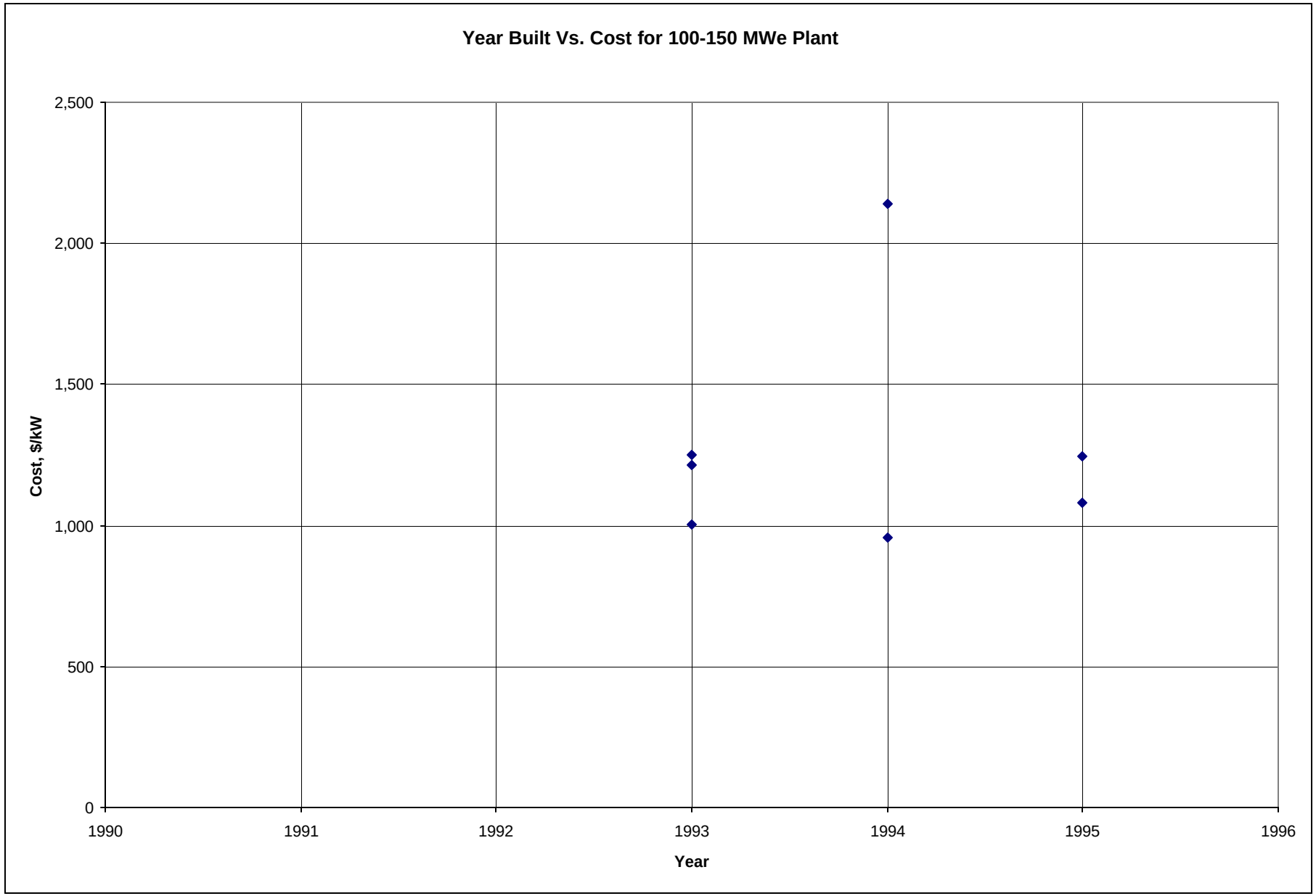

Year Built Vs. Cost for 100-150 MWe Plant
2,500
2,000
1,500
1,000
500
0
Cost, $/kW
1990
1991
1992
1993
1994
1995
1996
Year

Figure 6

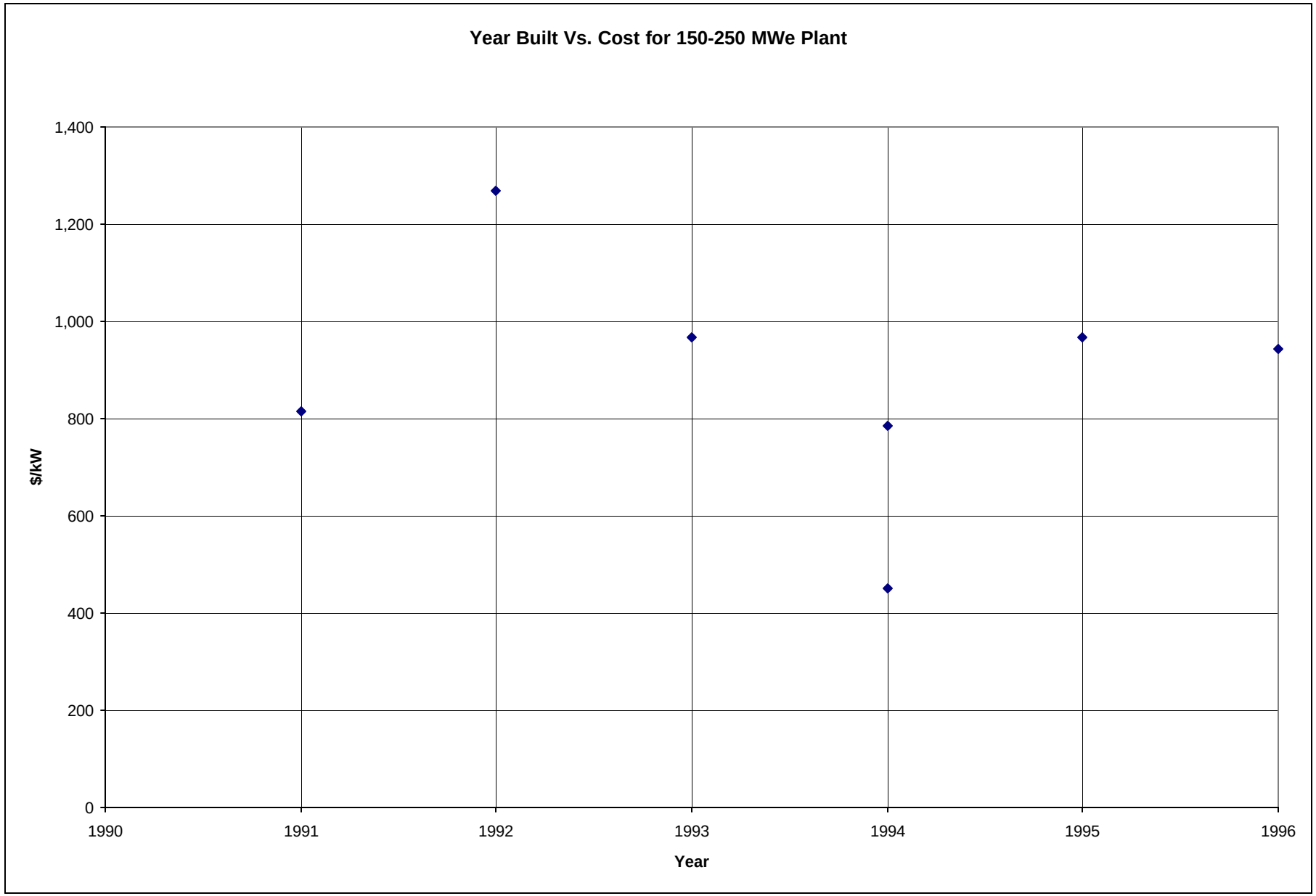

Year Built Vs. Cost for 150-250 MWe Plant
1,400
1,200
1,000
800
600
400
200
0
$/kW
1990
1991
1992
1993
1994
1995
1996
Year

Figure 7

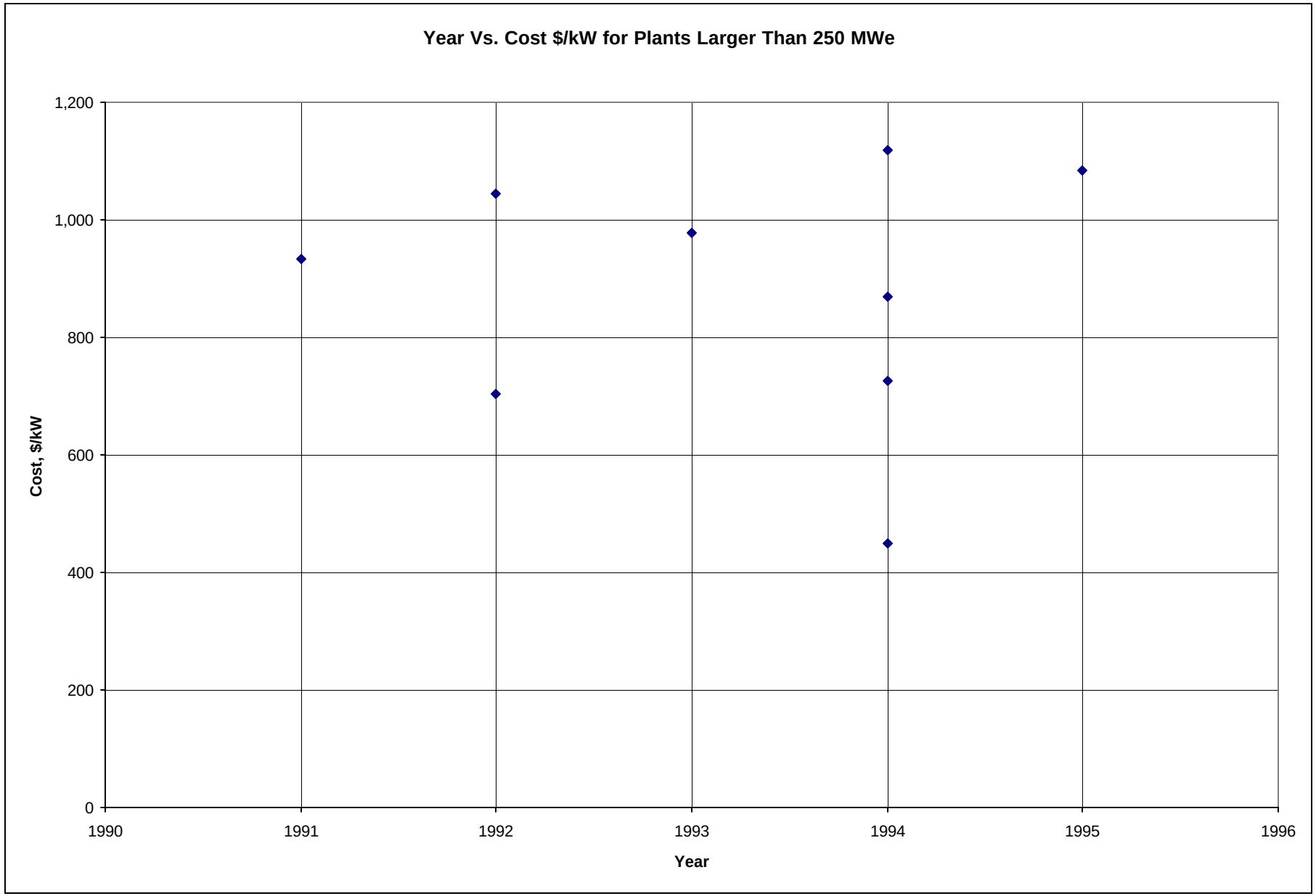

Year Vs. Cost $/kW for Plants Larger Than 250 MWe
Cost, $/kW
1,200
1,000
800
600
400
200
0
1990
1991
1992
1993
1994
1995
1996
Year

Figure 8

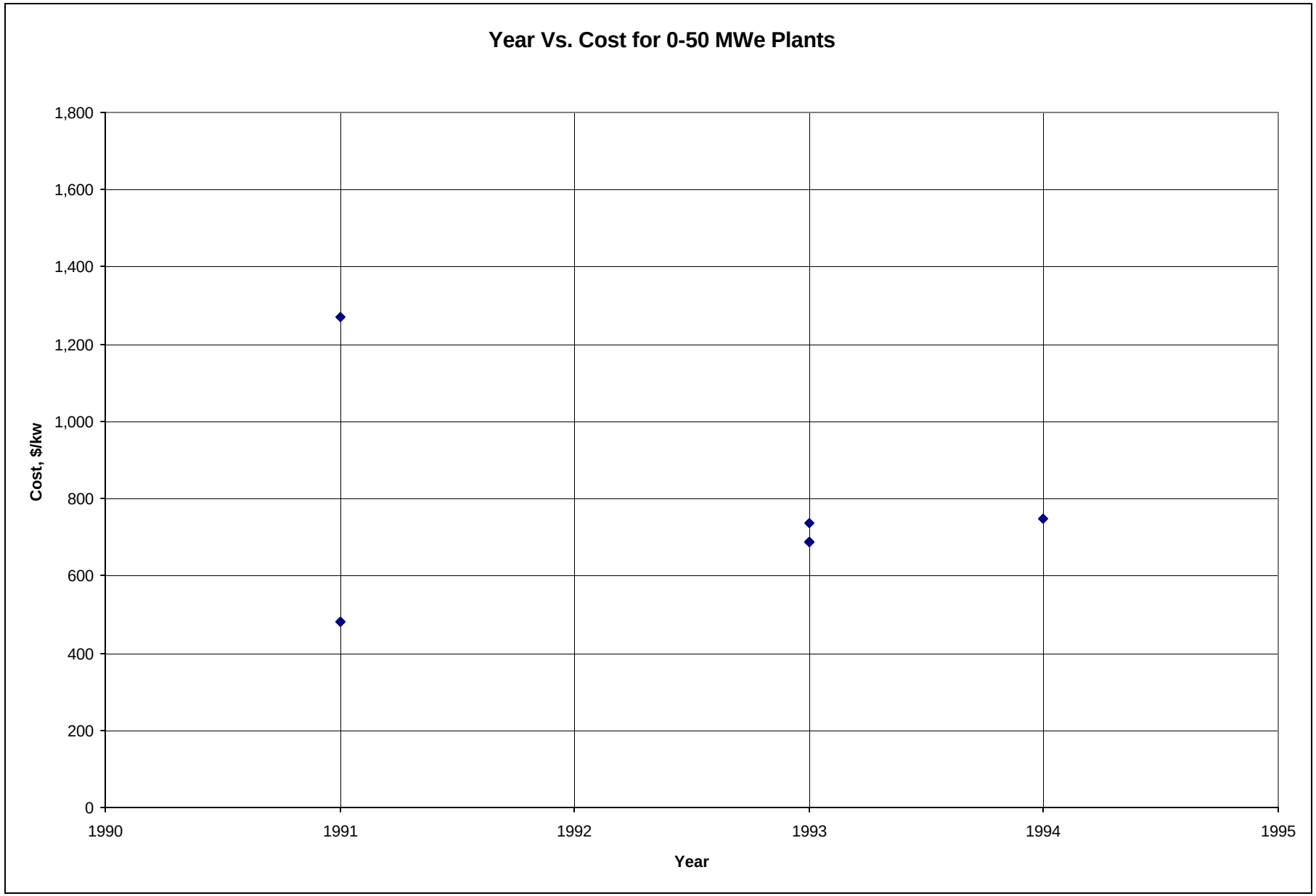

Year Vs. Cost for 0-50 MWe Plants
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Cost, $/kw
1990
1991
1992
1993
1994
1995
Year

Figure 9

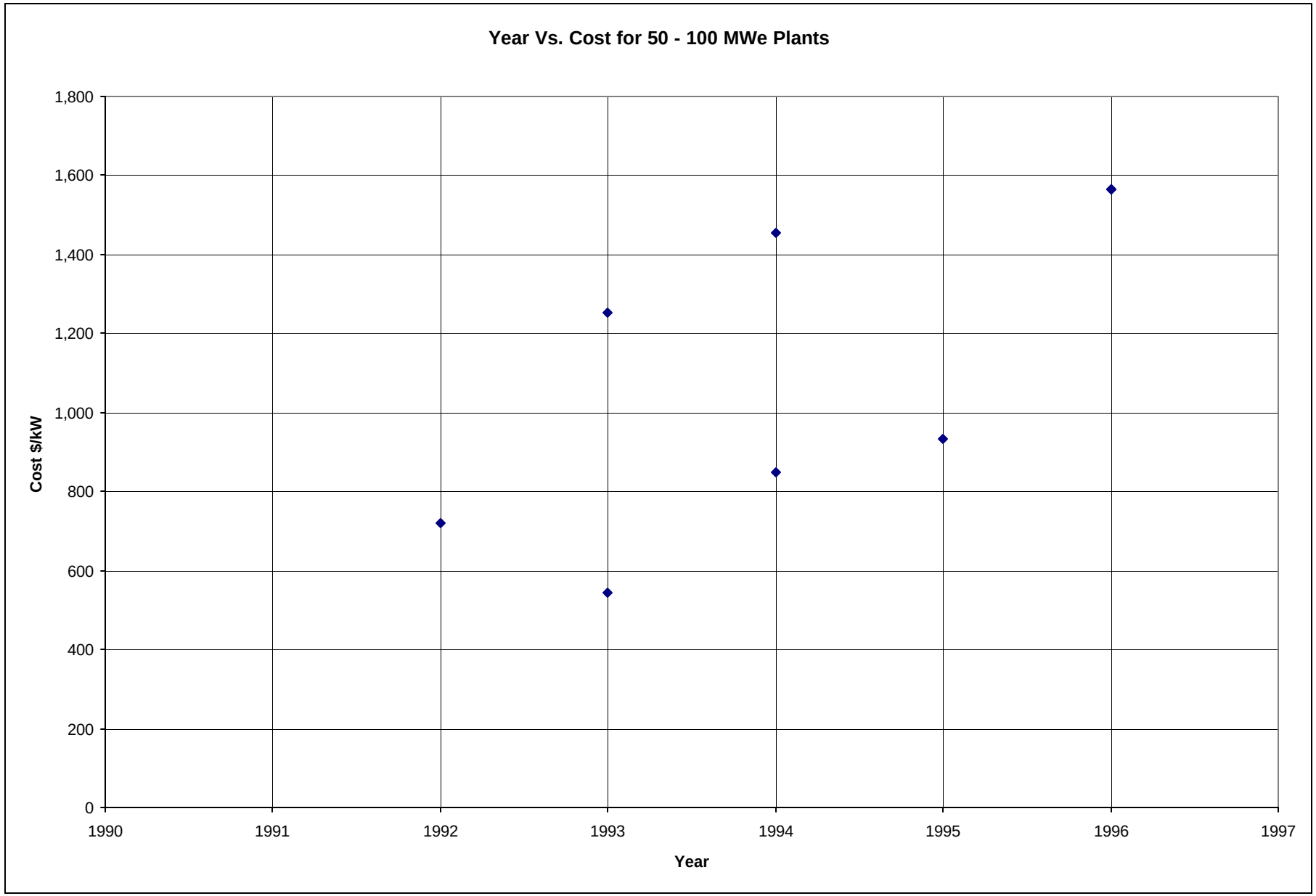

Year Vs. Cost for 50 - 100 MWe Plants
Cost $/kW
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1990
1991
1992
1993
1994
1995
1996
1997
Year

Figure 10

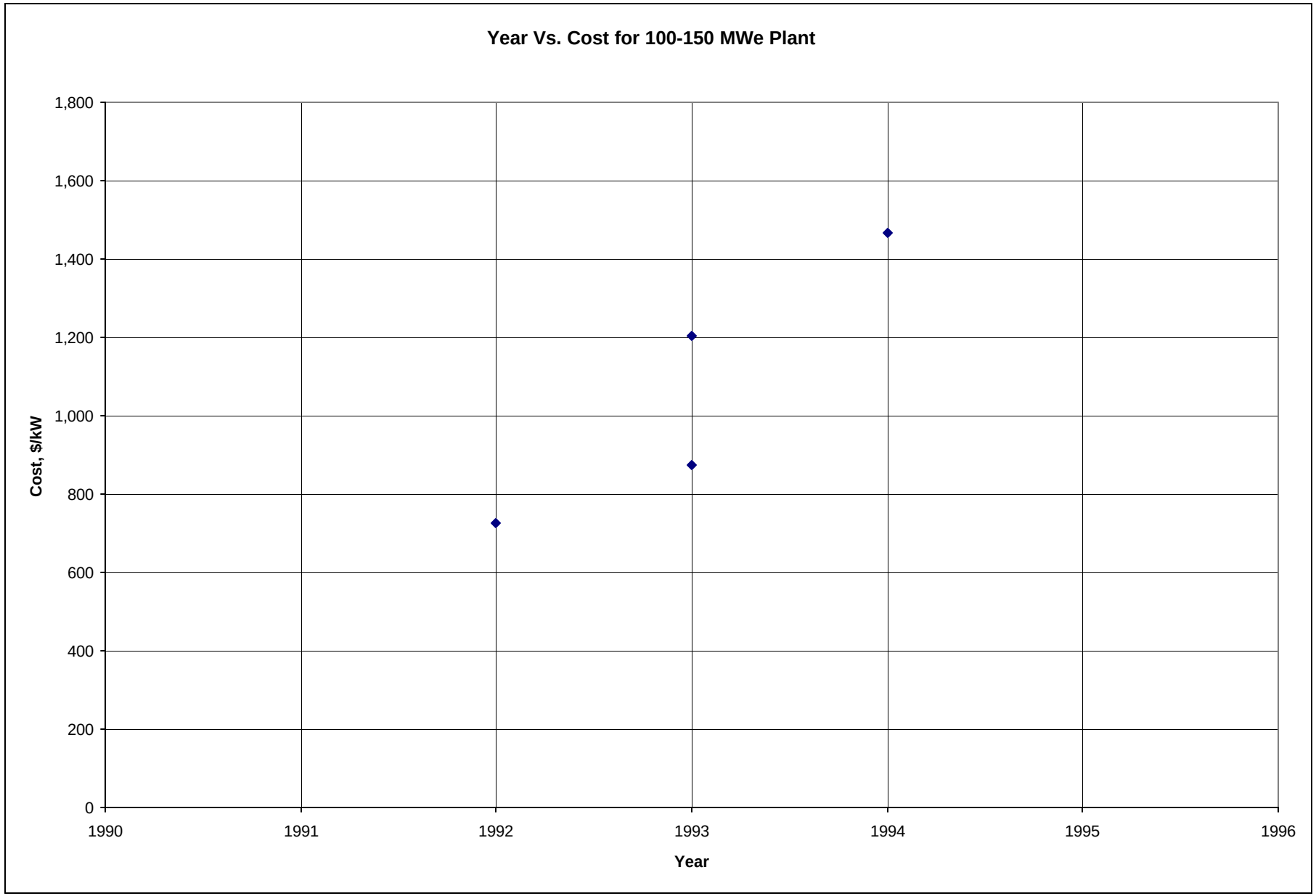

Year Vs. Cost for 100-150 MWe Plant
Cost, $/kW
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1990
1991
1992
1993
1994
1995
1996
Year

Figure 11

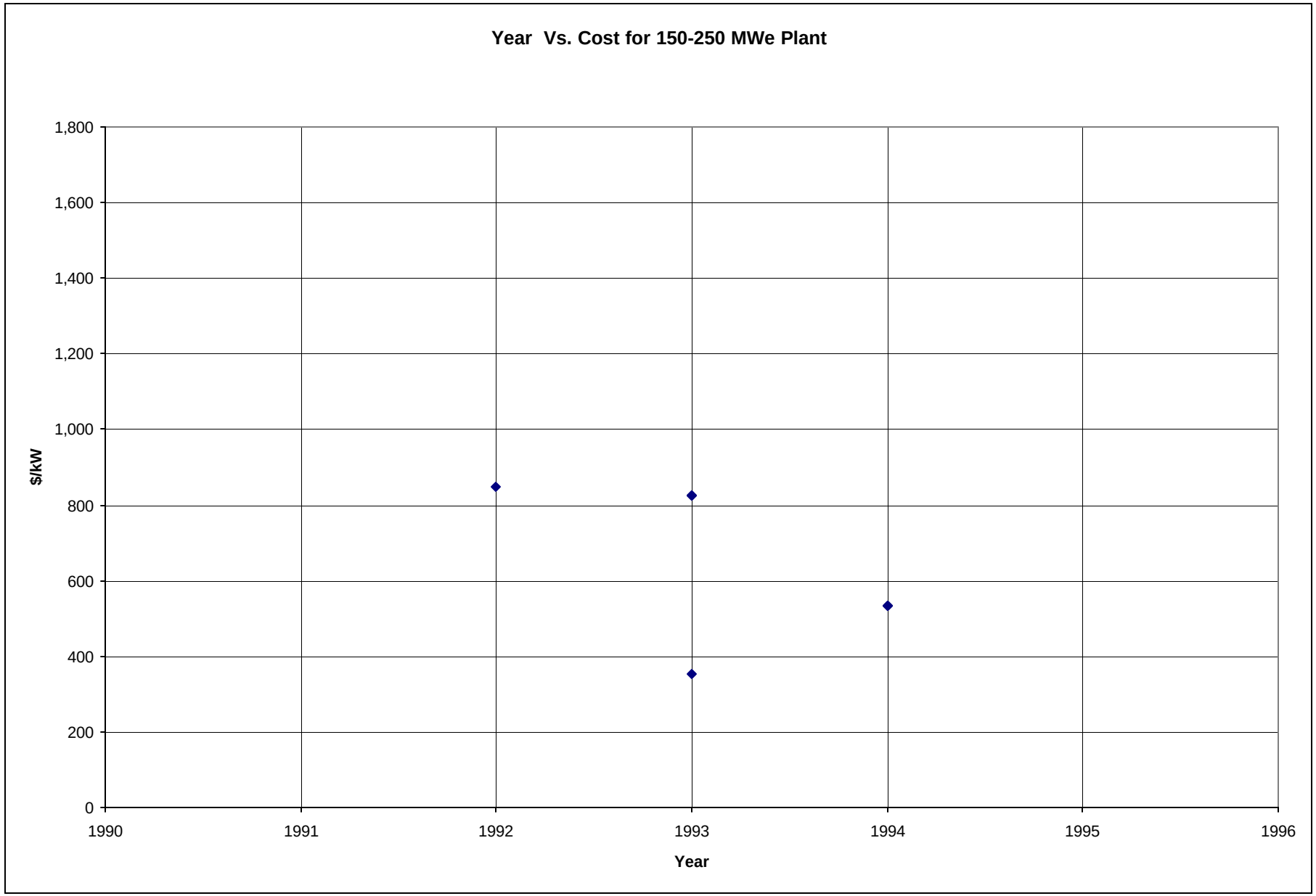

Year Vs. Cost for 150-250 MWe Plant
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
$/kW
1990
1991
1992
1993
1994
1995
1996
Year

Figure 12

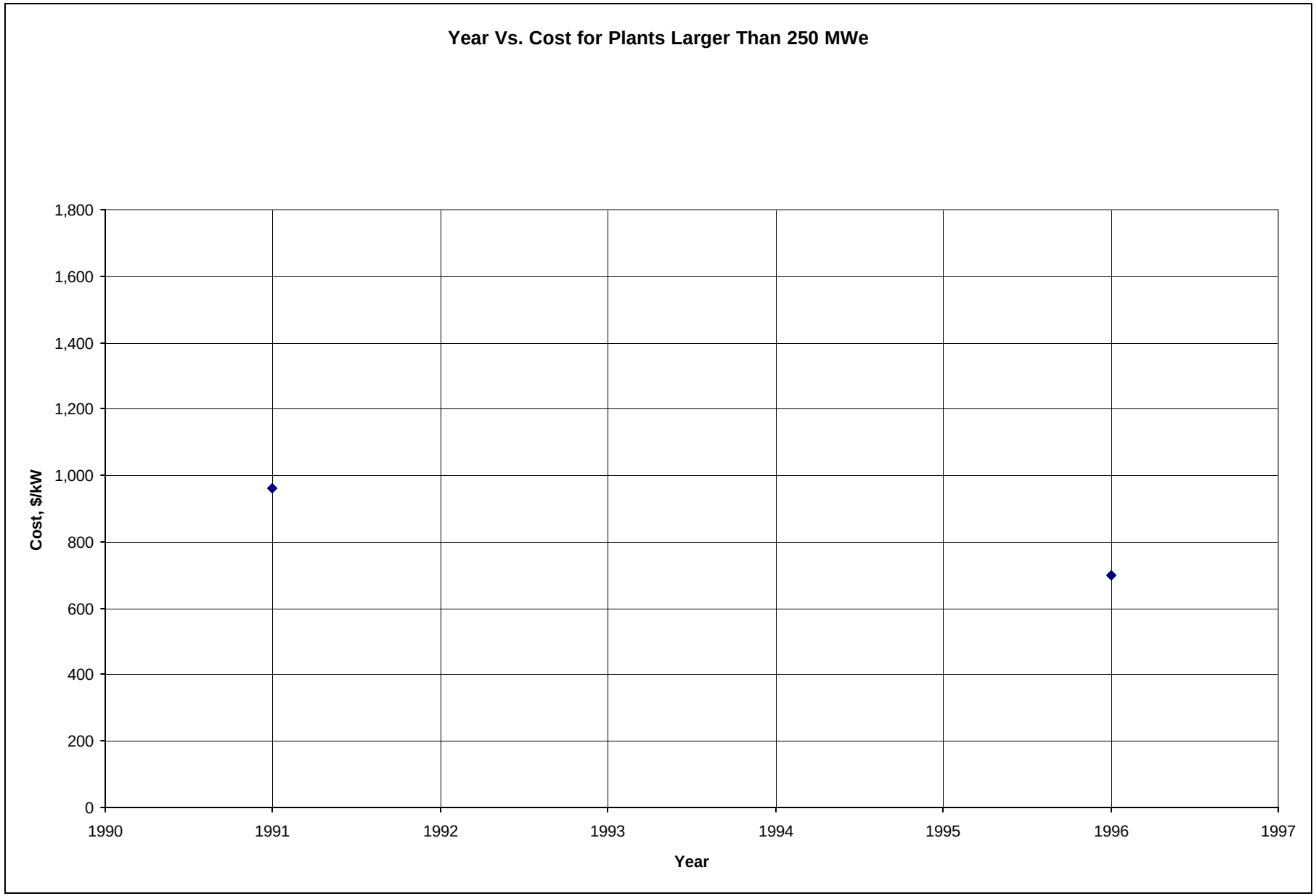

Year Vs. Cost for Plants Larger Than 250 MWe
Cost, $/kW
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1990
1991
1992
1993
1994
1995
1996
1997
Year

Figure 13

Regional Construction Labor Factors

Northeast	0.727802
Ohio River Valley	0.957854
Southeast	1.686341
Midwest	0.825764
Central	0.935454
South Central	1.347709
West Coast	0.809061
Northwest	0.94518
Hawaii	0.773395

APPENDIX D
RELIABILITY AND AVAILABILITY

The reference plant design presented in this section has reduced redundancy from reference designs produced in the past, yet maintains a high level of availability and reliability. Certain systems in a power plant have a history of causing plant outage or deratings. Table 1 gives the top 40 causes of outages and deratings for coal-fired power plants in the 400 to 599 MWe range.

This table is based on information compiled by the North American Electric Reliability Council, in a document titled, "Generating Availability Report 1985-1989." Each of the component availabilities is used to calculate the system availability. The system availabilities are then used to calculate plant availability. Plant availability is a measure of the amount of time a given plant is available to produce power. Through historic data from such sources as the North American Electric Reliability Council, and system availability calculations, the availability for a modern pulverized coal-fired electric power plant is expected to be in the range of 83 to 86 percent, considering planned and forced outages and deratings.

The information from the "Generating Availability Report" and other availability information was utilized in developing system block diagrams to determine the effects of reduced redundancy on system availability. System block diagrams for the coal handling system are included at the end of Appendix D. In Figure 1, a traditional utility type system with a majority of the system having redundant components is illustrated. Figure 2 shows a system as it would be designed today, with the redundancy reduced; however, some items are oversized to provide a margin that would allow the plant to repair a piece of equipment without losing generating capability. In addition, critical components with long "mean time to repair" times are still redundant (i.e., crushers) to maintain an acceptable availability rate. The differential in availability between Figure 1 and Figure 2 is 0.68 percent.

In Figure 3, a low capital cost design is analyzed. This design has eliminated the redundant equipment and reduced availability by 8.88 percent. This is a significant reduction in availability and would not be a recommended design. Major systems can be analyzed by this method to determine the optimum design, considering both capital cost and availability.

Table 1
OUTAGES AND DERATINGS FOR COAL-FIRED POWER PLANTS

System	Mean Time Between Failure, Hours	Mean Down Time, Hours	Availability
Boiler Overhaul	12,514	608.47	0.953631
Major Turbine Overhaul	36,500	850.05	0.977241
Boiler Inspections	33,692	448.14	0.986874
Furnace Wall	4,710	49.91	0.989515
Inspection	87,600	452.25	0.994864
First Reheater	12,167	52.98	0.995664
Electrostatic Precipitator Problems	3,490	14.20	0.995948
Economizer	13,273	40.86	0.996931
Electrostatic Precipitator Fouling	11,526	30.12	0.997394
Second Superheater	15,927	40.28	0.997477
Feedwater Pump	4,949	12.11	0.997559
First Superheater	21,366	49.91	0.997669
Major Overhaul	438,000	950.96	0.997834
Rotor Windings	292,000	707.01	0.997585
Boiler Water Condition (not feedwater water quality)	1,321	2.63	0.998013
Cyclone Furnace (in cyclone area only)	41,714	80.77	0.998067
Main Transformer	25,028	47.82	0.998093
Opacity - Fossil Steam Units	1,665	2.91	0.998255
High Pressure Heater Tube Leaks	8,848	14.43	0.998372
Vibration of the Turbine Generator Unit	13,273	19.40	0.998541
Second Reheater	38,087	55.15	0.998554
Pulverizer Mills	1,884	2.65	0.998595
Other Catastrophe	438,000	599.68	0.998633
Primary Air Heater (regenerative)	19,909	24.88	0.998752
Stator Windings, Bushings and Terminals	175,200	213.84	0.998781
Other Tubes	62,571	73.23	0.998831
Forced Draft Fans	30,207	35.87	0.998814
Other Steam Turbine Problems	32,444	38.81	0.998805
Generator Vibration	43,800	52.07	0.998813
Buckets or Blades	292,000	305.42	0.998955
Feedwater Pump Drive - Steam Turbine	8,588	9.48	0.998897
Boiler, Miscellaneous	12,696	13.98	0.9989
Condenser Tube Leaks	8,588	8.59	0.999001
Boiler Recirculation Pumps	25,028	23.94	0.999044
Primary Air Heater Fouling (regenerative)	27,375	25.74	0.999061
Bearings	58,400	57.07	0.999024
Combustion/Steam Condition Controls	12,167	11.29	0.999073
Reheat Steam Piping up to Turbine Stop Valves	219,000	210.92	0.999038
Induced Draft Fans	13,905	12.54	0.999099

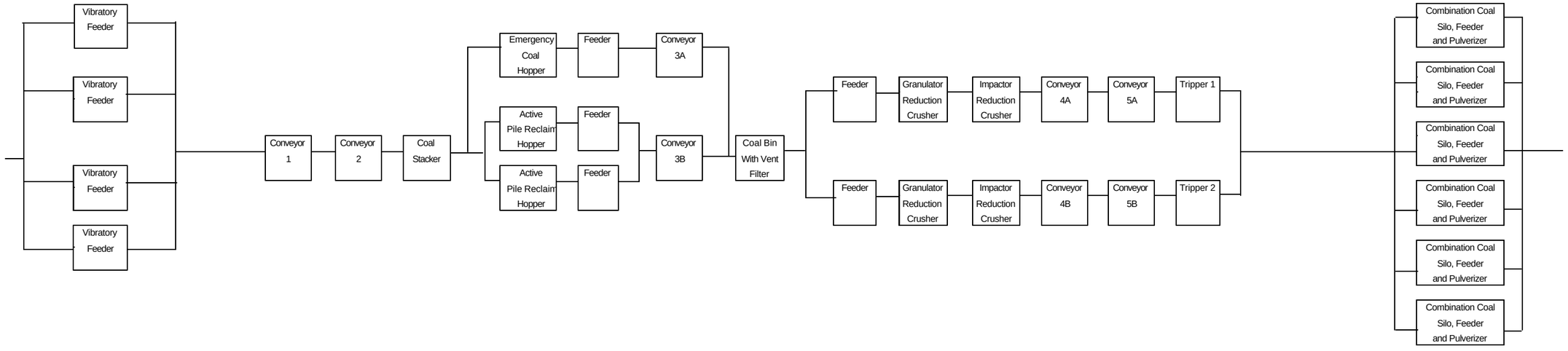
Assumptions

This reference plant design is based on the following assumptions:

- Initially a single unit facility is to be constructed including a single pulverized coal-fired boiler connected to a single turbine generator, with an FGD system integrated into the facility.
- Provisions have been make in the initial unit site layout arrangement to provide for the addition of a future second unit and the necessary support facilities.
- The circulating water heat sink is a mechanical draft evaporative cooling tower.
- Makeup and potable water for plant use is filtered and treated on site.
- Plant and sanitary wastes are held and treated on site.

This page left blank intentionally

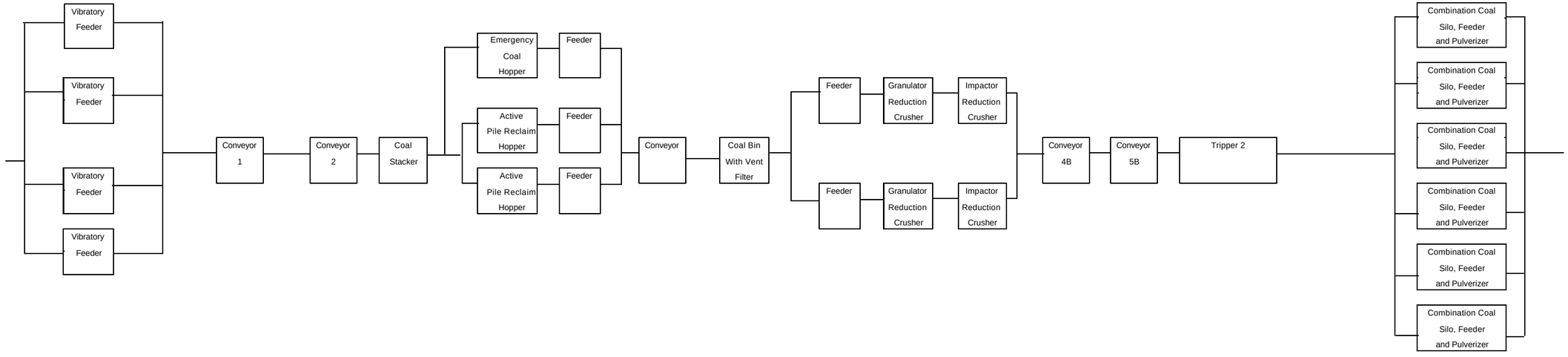
Figure 1
Utility Design Availability Analysis (Conceptual)
Coal Handling System Block Diagram



	Feeder		Conveyor	Conveyor	Coal Stacker	Hopper	Feeder	Conveyor	Bin	Feeder	Crusher	Crusher	Conveyor	Conveyor	Tripper	Coal Silo w/Vent Filter	Feeder	Pulverizer
MTBF, hrs	377.5		17520	17520	26280	12500	377.5	17520	2190	377.5	8760	8760	17520	17520	1752	91100	377.5	1884
MTTR, hrs	24		18	18	10	74.24	24	18	8.53	24	133	133	18	18	9	12.45	24	2.65
Availability of each component	0.940224		0.999	0.999	0.99962	0.9941	0.94	0.999	0.99612	0.94	0.98504	0.98504	0.999	0.999	0.9949	0.999863356	0.940224159	0.998595394
						Avail. of redundant active pile and	0.99573									Avai of each Combination Coal Silo, Feeder,	0.938775219	
Availability of redundant equipment	0.999184	Need 2 out of 4 Feeders operating				Avail. of active/ emergency reclaim system	0.99965			Avail. of redundant crusher trains	0.991					Need 4 out of 6 trains operating	0.996011865	

Availability of Coal Handling System	0.9798061
97.98% Available	

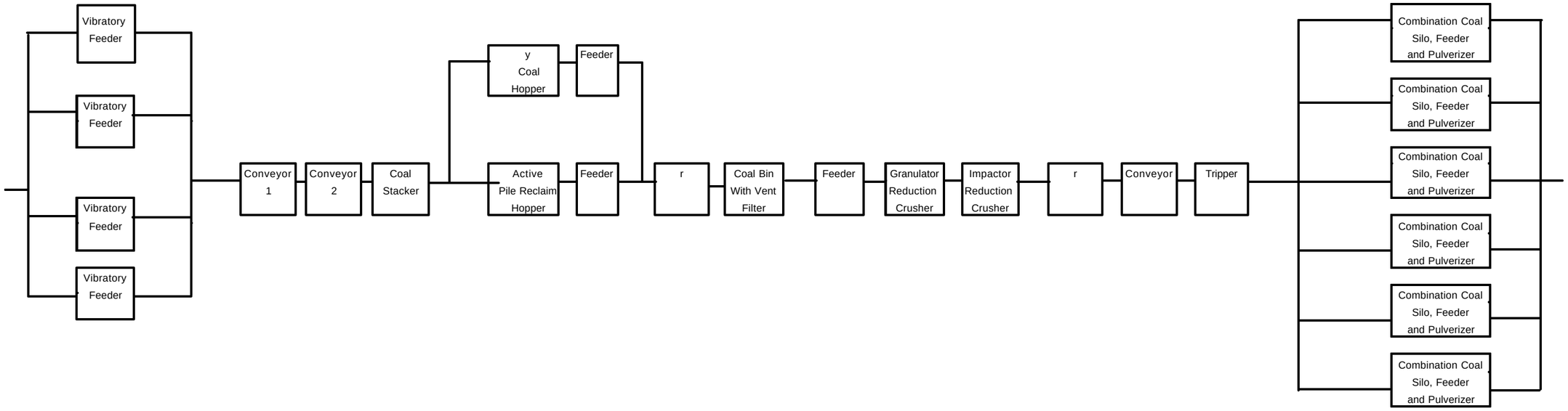
Figure 2
Non Utility Design Availability Analysis (Conceptual)
Coal Handling System Block Diagram



	Feeder		Conveyor	Conveyor	Coal Stacker	Hopper	Feeder	Conveyor	Bin	Feeder	Crusher	Crusher	Conveyor	Conveyor	Tripper	Coal Silo w/Vent Filter	Feeder	Pulverizer
MTBF	377.5		17520	17520	26280	12500	377.5	17520	2190	377.5	8760	8760	17520	17520	1752	91100	377.5	1884
MTTR	24		18	18	10	74.24	24	18	8.53	24	133	133	18	18	9	12.45	24	2.65
Availability of each	0.94022		0.999	0.999	0.99962	0.9941	0.94	0.999	0.99612	0.94	0.98504	0.98504	0.999	0.999	0.994889267	0.999863356	0.940224159	0.999
															Avail of each combination Coal Silo, Feeder, Pulverizer train	0.938775219		
						Avail. of active/ emergency reclaim system	0.99972			Avail. of redundant crusher train	0.992							
Availability of redundant equipment	0.99918	Need 2 out of 4 Feeders operating													Need 4 out of 6 operating	0.996011865		

Availability of Coal Handling System	**0.97303**
97.30% Available	

Figure 3
Low Capital Cost Design Availability Analysis (Conceptual)
Coal Handling System Block Diagram



	Feeder		Conveyor	Conveyor	Coal Stacker		Hopper	Feeder	Conveyor	Bin	Feeder	Crusher	Crusher	Conveyor	Conveyor	Tripper		Coal Silo w/Vent Filter		Feeder	Pulverizer
MTBF	377.5		17520	17520	26280		12500	377.5	17520	2190	377.5	8760	8760	17520	17520	1752		91100		377.5	1884
MDT	24		18	18	10		74.24	24	18	8.53	24	133	133	18	18	9		12.45		24	2.65
Availabvility of each component	0.94022		0.99897	0.99897	0.99962		0.9941	0.94	0.999	0.99612	0.9402	0.98504	0.98504	0.999	0.99897	0.9949		0.999863		0.9402	0.998595394
						Avail. of active/ emergency reclaim system	0.99573										Avail. of each combination Coal Silo, Feeder, Pulverizer train	0.938775			
Availability of redundant equipment	0.99918	Need 2 out of 4 Feeders operating															Need 4 out of 6 trains operating	0.996012			

Availablity of Coal Handling system	**0.89102**
89.10% Available	

Natural Gas Combined Cycle
“H” Class Gas Turbine

CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY

TITLE/DEFINITION

Case:	Natural Gas Combined Cycle-"H"			
Plant Size:	395.0 (MW,net)	HeatRate:	6,396	(Btu/kWh)
Primary/Secondary Fuel(type):	Natural Gas	Cost:	2.70	($/MMBtu)
Design/Construction:	2.25 (years)	BookLife:	20	(years)
TPC(Plant Cost) Year:	1998 (Jan.)	TPI Year:	2005	(Jan.)
Capacity Factor:	65 (%)			

CAPITAL INVESTMENT		**$x1000**	**$/kW**
Process Capital & Facilities		146,506	370.9
Engineering(incl.C.M.,H.O.& Fee)		11,720	29.7
Process Contingency			
Project Contingency		24,001	60.8
TOTAL PLANT COST(TPC)		$182,227	461.3
TOTAL CASH EXPENDED	$182,227		
AFDC	$6,825		
TOTAL PLANT INVESTMENT(TPI)		$189,052	478.6
Royalty Allowance			
Preproduction Costs		5,645	14.3
Inventory Capital		497	1.3
Initial Catalyst & Chemicals(w/equip.)			
Land Cost		150	0.4
TOTAL CAPITAL REQUIREMENT(TCR)		$195,344	494.5

OPERATING & MAINTENANCE COSTS (1998 Dollars)	**$x1000**	**$/kW-yr**
Operating Labor	1,474	3.7
Maintenance Labor	1,616	4.1
Maintenance Material	2,425	6.1
Administrative & Support Labor	773	2.0
TOTAL OPERATION & MAINTENANCE	$6,288	15.9
FIXED O & M	10.35	$/kW-yr
VARIABLE O & M	0.10	¢/kWh

CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars)	**$x1000**	**¢/kWh**
Water	445	0.02
Chemicals	258	0.01
Other Consumables		
Waste Disposal		
TOTAL CONSUMABLE OPERATING COSTS	$703	0.03

BY-PRODUCT CREDITS (1998 Dollars)

FUEL COST (1998 Dollars)	$38,875	1.73

	1st Year (2005 $)		**Levelized (10th.Year $)**	
PRODUCTION COST SUMMARY		**¢/kWh**		**¢/kWh**
Fixed O & M	10.3/kW-yr	0.18	10.3/kW-yr	0.18
Variable O & M		0.10		0.10
Consumables		0.03		0.03
By-product Credit				
Fuel		1.73		1.84
TOTAL PRODUCTION COST		2.04		2.15
LEVELIZED CARRYING CHARGES(Capital)			66.8/kW-yr	1.17
LEVELIZED (10th.Year) BUSBAR COST OF POWER				3.32

ESTIMATE BASIS/FINANCIAL CRITERIA for REVENUE REQUIREMENT CALCULATIONS

GENERAL DATA/CHARACTERISTICS

Case Title:	Natural Gas Combined Cycle-"H"			
Unit Size:/Plant Size:	395.0	MW,net	395.0	MWe
Location:	Middletown, USA			
Fuel: Primary/Secondary	Natural Gas			
Energy From Primary/Secondary Fuels	6,396	Btu/kWh		Btu/kWh
Levelized Capacity Factor / Preproduction(equivalent months):	65	%	1	months
Capital Cost Year Dollars (Reference Year Dollars):	1998	(January)		
Delivered Cost of Primary/Secondary Fuel	2.70	$/MBtu		$/MBtu
Design/Construction Period:	2.25	years		
Plant Startup Date (1st. Year Dollars):	2005	(January)		
Land Area/Unit Cost	100	acre	$1,500	/acre

FINANCIAL CRITERIA

Project Book Life:	20	years		
Book Salvage Value:		%		
Project Tax Life:	20	years		
Tax Depreciation Method:	Accel. based on ACRS Class			
Property Tax Rate:	1.0	% per year		
Insurance Tax Rate:	1.0	% per year		
Federal Income Tax Rate:	34.0	%		
State Income Tax Rate:	6.0	%		
Investment Tax Credit/% Eligible		%		%
Economic Basis:	10th.Year	Constant Dollars		

Capital Structure	% of Total	Cost(%)
Common Equity	20	16.5
Preferred Stock		
Debt	80	5.8
Weighted Cost of Capital:(after tax)		6.2 %

Escalation Rates	Over Book Life		1998 to 2005	
General		% per year		% per year
Primary Fuel	1.2	% per year	0.041	% per year
Secondary Fuel	1.2	% per year	0.041	% per year

Client: DEPARTMENT OF ENERGY - Task 36 **Report Date:** 17-Dec-98
Project: Market Based Advanced Coal Power Systems 05:44 PM

TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"H"
Plant Size: 395.0 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
2	COAL & SORBENT PREP & FEED											
3	FEEDWATER & MISC. BOP SYSTEMS	5,172	2,381	4,027	282		**$11,862**	949		3,110	**$15,922**	40
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries											
4.2	High Temperature Cooling											
4.3	Recycle Gas System											
4.4-4.9	Other Gasification Equipment											
	SUBTOTAL 4											
5	HOT GAS CLEANUP & PIPING											
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	41,448		3,306	231		**$44,986**	3,599		4,859	**$53,444**	135
6.2-6.9	Combustion Turbine Accessories		148	170	12		**$330**	26		107	**$463**	1
	SUBTOTAL 6	*41,448*	*148*	*3,477*	*243*		***$45,316***	*3,625*		*4,965*	***$53,907***	*136*
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	13,414		1,928	135		**$15,477**	1,238		1,672	**$18,387**	47
7.2-7.9	HRSG Accessories, Ductwork and Stack	1,758	654	1,241	87		**$3,740**	299		560	**$4,600**	12
	SUBTOTAL 7	*15,172*	*654*	*3,169*	*222*		***$19,217***	*1,537*		*2,232*	***$22,986***	*58*
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	9,984		1,828	128		**$11,940**	955		1,289	**$14,184**	36
8.2-8.9	Turbine Plant Auxiliaries and Steam Pipin	4,883	149	2,678	187		**$7,897**	632		1,469	**$9,997**	25
	SUBTOTAL 8	*14,867*	*149*	*4,506*	*315*		***$19,837***	*1,587*		*2,758*	***$24,182***	*61*
9	COOLING WATER SYSTEM	3,476	1,935	3,275	229		**$8,916**	713		1,731	**$11,360**	29
10	ASH/SPENT SORBENT HANDLING SYS											
11	ACCESSORY ELECTRIC PLANT	8,105	1,811	4,912	344		**$15,171**	1,214		2,649	**$19,034**	48
12	INSTRUMENTATION & CONTROL	2,867	1,469	5,115	358		**$9,810**	785		1,766	**$12,361**	31
13	IMPROVEMENTS TO SITE	1,831	1,053	3,667	257		**$6,807**	545		2,206	**$9,557**	24
14	BUILDINGS & STRUCTURES		4,001	5,204	364		**$9,569**	766		2,584	**$12,918**	33
	TOTAL COST	**$92,938**	**$13,601**	**$37,352**	**$2,615**		**$146,506**	**$11,720**		**$24,001**	**$182,227**	**461**

Client: DEPARTMENT OF ENERGY - Task 36 **Report Date:** 17-Dec-98

Project: Market Based Advanced Coal Power Systems 05:44 PM

TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"H"

Plant Size: 395.0 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
1.1	Coal Receive & Unload											
1.2	Coal Stackout & Reclaim											
1.3	Coal Conveyors & Yd Crush											
1.4	Other Coal Handling											
1.5	Sorbent Receive & Unload											
1.6	Sorbent Stackout,Storage & Reclaim											
1.7	Sorbent Conveyors											
1.8	Other Sorbent Handling											
1.9	Coal & Sorbent Hnd.Foundations											
	SUBTOTAL 1.											
2	COAL & SORBENT PREP & FEED											
2.1	Coal Crushing & Drying											
2.2	Prepared Coal Storage & Feed											
2.3	Coal & Sorbent Feed System											
2.4	Misc.Coal Prep & Feed											
2.5	Sorbent Prep Equipment											
2.6	Sorbent Storage & Feed											
2.7	Sorbent Injection System											
2.8	Booster Air Supply System											
2.9	Coal & Sorbent Feed Foundation											
	SUBTOTAL 2.											
3	FEEDWATER & MISC. BOP SYSTEMS											
3.1	FeedwaterSystem	644	1,252	668	47		$2,611	209		564	$3,384	9
3.2	Water Makeup & Pretreating	354	38	203	14		$610	49		197	$856	2
3.3	Other Feedwater Subsystems	383	143	130	9		$666	53		144	$863	2
3.4	Service Water Systems	27	58	205	14		$306	24		99	$429	1
3.5	Other Boiler Plant Systems	1,159	468	1,172	82		$2,880	230		622	$3,733	9
3.6	FO Supply Sys & Nat Gas	94	178	336	24		$632	51		136	$818	2
3.7	Waste Treatment Equipment	704		413	29		$1,146	92		371	$1,609	4
3.8	Misc. Power Plant Equipment	1,806	244	900	63		$3,013	241		976	$4,230	11
	SUBTOTAL 3.	**$5,172**	**$2,381**	**$4,027**	**$282**		**$11,862**	**$949**		**$3,110**	**$15,922**	**40**
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries											
4.2	High Temperature Cooling											
4.3	Recycle Gas System											
4.4	Booster Air Compression											
4.5	Misc. Gasification Equipment	w/4.1&4.2		w/4.1&4.2								
4.6	Other Gasification Equipment											
4.8	Major Component Rigging	w/4.1&4.2		w/4.1&4.2								
4.9	Gasification Foundations											
	SUBTOTAL 4.											

Client: DEPARTMENT OF ENERGY - Task 36 **Report Date:** 17-Dec-98
Project: Market Based Advanced Coal Power Systems 05:44 PM

TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"H"
Plant Size: 395.0 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
5	HOT GAS CLEANUP & PIPING											
5.1	Gas Desulfurization(Trans.Reactor)											
5.2	Sulfur Recovery (Sulfator Sys.)											
5.3	Chloride Guard											
5.4	Particulate Removal											
5.5	Blowback Gas Systems											
5.6	Fuel Gas Piping											
5.9	HGCU Foundations											
	SUBTOTAL 5.											
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	41,448		3,306	231		$44,986	3,599		4,859	$53,444	135
6.2	Combustion Turbine Accessories	w/6.1		w/6.1								
6.3	Compressed Air Piping											
6.9	Combustion Turbine Foundations		148	170	12		$330	26		107	$463	1
	SUBTOTAL 6.	**$41,448**	**$148**	**$3,477**	**$243**		**$45,316**	**$3,625**		**$4,965**	**$53,907**	**136**
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	13,414		1,928	135		$15,477	1,238		1,672	$18,387	47
7.2	HRSG Accessories											
7.3	Ductwork		568	487	34		$1,089	87		235	$1,412	4
7.4	Stack	1,758		667	47		$2,472	198		267	$2,937	7
7.9	HRSG,Duct & Stack Foundations		86	86	6		$179	14		58	$251	1
	SUBTOTAL 7.	**$15,172**	**$654**	**$3,169**	**$222**		**$19,217**	**$1,537**		**$2,232**	**$22,986**	**58**
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	9,984		1,828	128		$11,940	955		1,289	$14,184	36
8.2	Turbine Plant Auxiliaries	77		179	13		$268	21		29	$319	1
8.3	Condenser & Auxiliaries	1,986		550	38		$2,574	206		278	$3,058	8
8.4	Steam Piping	2,820		1,485	104		$4,409	353		952	$5,714	14
8.9	TG Foundations		149	464	33		$646	52		209	$906	2
	SUBTOTAL 8.	**$14,867**	**$149**	**$4,506**	**$315**		**$19,837**	**$1,587**		**$2,758**	**$24,182**	**61**
9	COOLING WATER SYSTEM											
9.1	Cooling Towers	2,652		588	41		$3,281	262		354	$3,898	10
9.2	Circulating Water Pumps	388		37	3		$427	34		46	$508	1
9.3	Circ.Water System Auxiliaries	47		7	0		$55	4		6	$65	0
9.4	Circ.Water Piping		919	1,033	72		$2,025	162		437	$2,625	7
9.5	Make-up Water System	106		158	11		$275	22		59	$356	1
9.6	Component Cooling Water Sys	284	339	252	18		$892	71		193	$1,156	3
9.9	Circ.Water System Foundations		677	1,200	84		$1,961	157		635	$2,753	7
	SUBTOTAL 9.	**$3,476**	**$1,935**	**$3,275**	**$229**		**$8,916**	**$713**		**$1,731**	**$11,360**	**29**
10	ASH/SPENT SORBENT HANDLING SYS											
10.1	Gasifier Ash Removal											
10.2	Gasifier Ash Depressurization											
10.3	Cleanup Ash Depressurization											
10.4	High Temperature Ash Piping											
10.5	Other Ash Recovery Equipment											
10.6	Ash Storage Silos											
10.7	Ash Transport & Feed Equipment											
10.8	Misc. Ash Handling Equipment											
10.9	Ash/Spent Sorbent Foundation											
	SUBTOTAL 10.											

Client: DEPARTMENT OF ENERGY - Task 36 **Report Date:** 17-Dec-98
Project: Market Based Advanced Coal Power Systems 05:44 PM

TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"H"
Plant Size: 395.0 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
11	ACCESSORY ELECTRIC PLANT											
11.1	Generator Equipment	1,377		219	15		$1,610	129		174	$1,913	5
11.2	Station Service Equipment	1,588		131	9		$1,728	138		187	$2,053	5
11.3	Switchgear & Motor Control	1,266		211	15		$1,491	119		242	$1,852	5
11.4	Conduit & Cable Tray		763	2,395	168		$3,326	266		718	$4,310	11
11.5	Wire & Cable		819	818	57		$1,695	136		366	$2,197	6
11.6	Protective Equipment		72	239	17		$327	26		53	$407	1
11.7	Standby Equipment	639		14	1		$655	52		106	$813	2
11.8	Main Power Transformers	3,235		454	32		$3,721	298		603	$4,621	12
11.9	Electrical Foundations		156	432	30		$618	49		200	$868	2
	SUBTOTAL 11.	**$8,105**	**$1,811**	**$4,912**	**$344**		**$15,171**	**$1,214**		**$2,649**	**$19,034**	**48**
12	INSTRUMENTATION & CONTROL											
12.1	IGCC Control Equipment											
12.2	Combustion Turbine Control											
12.3	Steam Turbine Control											
12.4	Other Major Component Control											
12.5	Signal Processing Equipment	w/12.7		w/12.7								
12.6	Control Boards,Panels & Racks	118		69	5		$192	15		41	$249	1
12.7	Computer & Accessories	1,883		97	7		$1,986	159		215	$2,360	6
12.8	Instrument Wiring & Tubing		1,469	4,565	320		$6,353	508		1,372	$8,234	21
12.9	Other I & C Equipment	866		385	27		$1,278	102		138	$1,519	4
	SUBTOTAL 12.	**$2,867**	**$1,469**	**$5,115**	**$358**		**$9,810**	**$785**		**$1,766**	**$12,361**	**31**
13	IMPROVEMENTS TO SITE											
13.1	Site Preparation		31	612	43		$685	55		222	$962	2
13.2	Site Improvements		1,022	1,261	88		$2,371	190		768	$3,329	8
13.3	Site Facilities	1,831		1,794	126		$3,751	300		1,215	$5,266	13
	SUBTOTAL 13.	**$1,831**	**$1,053**	**$3,667**	**$257**		**$6,807**	**$545**		**$2,206**	**$9,557**	**24**
14	BUILDINGS & STRUCTURES											
14.1	Combustion Turbine Area		223	141	10		$374	30		101	$504	1
14.2	Steam Turbine Building		1,652	2,621	183		$4,456	357		1,203	$6,016	15
14.3	Administration Building		422	341	24		$786	63		212	$1,061	3
14.4	Circulation Water Pumphouse		83	49	3		$135	11		37	$183	0
14.5	Water Treatment Buildings		526	571	40		$1,137	91		307	$1,535	4
14.6	Machine Shop		216	164	12		$392	31		106	$529	1
14.7	Warehouse		348	250	18		$616	49		166	$832	2
14.8	Other Buildings & Structures		209	181	13		$402	32		109	$543	1
14.9	Waste Treating Building & Str.		322	886	62		$1,270	102		343	$1,715	4
	SUBTOTAL 14.		**$4,001**	**$5,204**	**$364**		**$9,569**	**$766**		**$2,584**	**$12,918**	**33**
	TOTAL COST	**$92,938**	**$13,601**	**$37,352**	**$2,615**		**$146,506**	**$11,720**		**$24,001**	**$182,227**	**461**

CONTINGENCY FACTORS

Natural Gas Combined Cycle-"H"

Item/Description	Contingency Factors(%) %Process	%Project
COAL & SORBENT HANDLING		
COAL & SORBENT PREP & FEED		
FEEDWATER & MISC. BOP SYSTEMS		24.3
GASIFIER & ACCESSORIES		
Gasifier & Auxiliaries		
High Temperature Cooling		
Recycle Gas System		
Other Gasification Equipment		
HOT GAS CLEANUP & PIPING		
COMBUSTION TURBINE/ACCESSORIES		
Combustion Turbine Generator		10.0
Combustion Turbine Accessories		30.0
HRSG, DUCTING & STACK		
Heat Recovery Steam Generator		10.0
HRSG Accessories, Ductwork and Stack		13.9
STEAM TURBINE GENERATOR		
Steam TG & Accessories		10.0
Turbine Plant Auxiliaries and Steam Piping		17.2
COOLING WATER SYSTEM		18.0
ASH/SPENT SORBENT HANDLING SYS		
ACCESSORY ELECTRIC PLANT		16.2
INSTRUMENTATION & CONTROL		16.7
IMPROVEMENTS TO SITE		30.0
BUILDINGS & STRUCTURES		25.0

OPERATING LABOR REQUIREMENTS			
Natural Gas Combined Cycle-"H"			
Operating Labor Rate(base):	25.89	$/hour	
Operating Labor Burden:	30.00	% of base	
Labor O-H Charge Rate:	25.00	% of labor	
Operating Labor Requirements(O.J.)per Shift:			
Category	1 unit/mod.		Total Plant
Skilled Operator	1.0		1.0
Operator	2.0		2.0
Foreman	1.0		1.0
Lab Tech's, etc.	1.0		1.0
TOTAL-O.J.'s	5.0		5.0

CONSUMABLES, BY-PRODUCTS & FUELS DATA			
Natural Gas Combined Cycle-"H"			
	Consumption		Unit
Item/Description	Initial	/Day	Cost
Water(/1000 gallons)		2,344	0.80
Chemicals*			
MU & WT Chem.(lbs)**	209,444	6,981	0.16
Limestone (ton)**			15.78
Z Sorb (lbs)**			3.50
Nahcolite(ton)**			270.00
Other			
Supplemental Fuel(MBtu)**			
Gases,N2 etc.(/100scf)			
L.P. Steam(/1000 pounds)			
Waste Disposal			
Sludge(ton)			
Slag(ton)			10.00
By-products & Emissions			
Sulfuric Acid(pounds)			68.00
Fuel(MMBtu)		60,638	2.70

MAINTENANCE FACTORS
Natural Gas Combined Cycle-"H"

Item/Description	Maintenance %
COAL & SORBENT HANDLING	
COAL & SORBENT PREP & FEED	
FEEDWATER & MISC. BOP SYSTEMS	2.0
GASIFIER & ACCESSORIES	
Gasifier & Auxiliaries	
High Temperature Cooling	
Recycle Gas System	
Other Gasification Equipment	
HOT GAS CLEANUP & PIPING	
COMBUSTION TURBINE/ACCESSORIES	
Combustion Turbine Generator	11.4
Combustion Turbine Accessories	0.5
HRSG, DUCTING & STACK	
Heat Recovery Steam Generator	2.0
HRSG Accessories, Ductwork and Stack	1.5
STEAM TURBINE GENERATOR	
Steam TG & Accessories	1.5
Turbine Plant Auxiliaries and Steam Piping	1.7
COOLING WATER SYSTEM	1.3
ASH/SPENT SORBENT HANDLING SYS	
ACCESSORY ELECTRIC PLANT	1.5
INSTRUMENTATION & CONTROL	1.6
IMPROVEMENTS TO SITE	1.2
BUILDINGS & STRUCTURES	1.4

Subcritical PC

CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY

TITLE/DEFINITION

Case:	Subcritical PC			
Plant Size:	397.5 (MW,net)	HeatRate:	9,077	(Btu/kWh)
Primary/Secondary Fuel(type):	Illnois #6	Cost:	1.26	($/MMBtu)
Design/Construction:	3 (years)	BookLife:	20	(years)
TPC(Plant Cost) Year:	1998 (Jan.)	TPI Year:	2005	(Jan.)
Capacity Factor:	85 (%)			

CAPITAL INVESTMENT		**$x1000**	**$/kW**
Process Capital & Facilities		360,255	906.3
Engineering(incl.C.M.,H.O.& Fee)		28,820	72.5
Process Contingency			
Project Contingency		59,765	150.4
TOTAL PLANT COST(TPC)		$448,840	1129.2
TOTAL CASH EXPENDED	$448,840		
AFDC	$22,443		
TOTAL PLANT INVESTMENT(TPI)		$471,283	1185.7
Royalty Allowance			
Preproduction Costs		11,570	29.1
Inventory Capital		4,253	10.7
Initial Catalyst & Chemicals(w/equip.)			
Land Cost		480	1.2
TOTAL CAPITAL REQUIREMENT(TCR)		$487,586	1226.7

OPERATING & MAINTENANCE COSTS (1998 Dollars)	**$x1000**	**$/kW-yr**
Operating Labor	4,127	10.4
Maintenance Labor	2,001	5.0
Maintenance Material	3,002	7.6
Administrative & Support Labor	1,532	3.9
TOTAL OPERATION & MAINTENANCE	$10,662	26.8

FIXED O & M	22.80	$/kW-yr
VARIABLE O & M	0.05	¢/kWh

CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars)	**$x1000**	**¢/kWh**
Water	1,359	0.05
Chemicals	2,643	0.09
Other Consumables		
Waste Disposal	1,150	0.04
TOTAL CONSUMABLE OPERATING COSTS	$5,152	0.17

BY-PRODUCT CREDITS (1998 Dollars)

FUEL COST (1998 Dollars)	$33,719	1.14

	1st Year (2005 $)		**Levelized (10th.Year $)**	
PRODUCTION COST SUMMARY		**¢/kWh**		**¢/kWh**
Fixed O & M	22.8/kW-yr	0.31	22.8/kW-yr	0.31
Variable O & M		0.05		0.05
Consumables		0.17		0.17
By-product Credit				
Fuel		1.04		0.98
TOTAL PRODUCTION COST		1.57		1.52
LEVELIZED CARRYING CHARGES(Capital)			165.6/kW-yr	2.22
LEVELIZED (10th.Year) BUSBAR COST OF POWER				3.74

ESTIMATE BASIS/FINANCIAL CRITERIA for REVENUE REQUIREMENT CALCULATIONS

GENERAL DATA/CHARACTERISTICS

Case Title:	Subcritical PC			
Unit Size:/Plant Size:	397.5	MW,net	397.5	MWe
Location:	Middletown, USA			
Fuel: Primary/Secondary	Illnois #6			
Energy From Primary/Secondary Fuels	9,077	Btu/kWh		Btu/kWh
Levelized Capacity Factor / Preproduction(equivalent months):	85	%	1	months
Capital Cost Year Dollars (Reference Year Dollars):	1998	(January)		
Delivered Cost of Primary/Secondary Fuel	1.26	$/MBtu		$/MBtu
Design/Construction Period:	3	years		
Plant Startup Date (1st. Year Dollars):	2005	(January)		
Land Area/Unit Cost	320	acre	$1,500	/acre

FINANCIAL CRITERIA

Project Book Life:	20	years		
Book Salvage Value:		%		
Project Tax Life:	20	years		
Tax Depreciation Method:	Accel. based on ACRS Class			
Property Tax Rate:	1.0	% per year		
Insurance Tax Rate:	1.0	% per year		
Federal Income Tax Rate:	34.0	%		
State Income Tax Rate:	6.0	%		
Investment Tax Credit/% Eligible		%		%
Economic Basis:	10th.Year	Constant Dollars		

Capital Structure	% of Total	Cost(%)
Common Equity	20	16.5
Preferred Stock		
Debt	80	5.8
Weighted Cost of Capital:(after tax)		6.2 %

Escalation Rates	Over Book Life		1998 to 2005	
General		% per year		% per year
Primary Fuel	-1.1	% per year	-1.36	% per year
Secondary Fuel	1.2	% per year	0.041	% per year

Client: DEPARTMENT OF ENERGY
Project: Market Based Advanced Coal Power Systems
Report Date: 14-Aug-98
07:54 AM

TOTAL PLANT COST SUMMARY

Case: Subcritical PC
Plant Size: 397.5 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING	6,997	2,063	5,331	373		**$14,764**	1,181		3,189	**$19,134**	48
2	COAL & SORBENT PREP & FEED	8,789		2,748	192		**$11,729**	938		2,533	**$15,201**	38
3	FEEDWATER & MISC. BOP SYSTEMS	15,953		6,963	487		**$23,403**	1,872		6,002	**$31,276**	79
4	PC BOILER & ACCESSORIES											
4.1	PC Boiler	46,861		19,453	1,362		**$67,676**	5,414		7,309	**$80,400**	202
4.2	Open											
4.3	Open											
4.4-4.9	Boiler BoP (w/FD & ID Fans)	3,260		1,074	75		**$4,410**	353		476	**$5,239**	13
	SUBTOTAL 4	*50,122*		*20,528*	*1,437*		***$72,086***	*5,767*		*7,785*	***$85,639***	*215*
5	FLUE GAS CLEANUP	34,039		18,650	1,306		**$53,995**	4,320		5,831	**$64,146**	161
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	N/A		N/A								
6.2-6.9	Combustion Turbine Accessories											
	SUBTOTAL 6											
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	N/A		N/A								
7.2-7.9	HRSG Accessories, Ductwork and Stack	9,803	289	7,270	509		**$17,871**	1,430		2,992	**$22,293**	56
	SUBTOTAL 7	*9,803*	*289*	*7,270*	*509*		***$17,871***	*1,430*		*2,992*	***$22,293***	*56*
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	30,684		5,055	354		**$36,093**	2,887		3,898	**$42,879**	108
8.2-8.9	Turbine Plant Auxiliaries and Steam Pipin	11,740	358	6,439	451		**$18,988**	1,519		3,531	**$24,037**	60
	SUBTOTAL 8	*42,424*	*358*	*11,494*	*805*		***$55,081***	*4,406*		*7,429*	***$66,916***	*168*
9	COOLING WATER SYSTEM	7,623	3,966	7,208	505		**$19,301**	1,544		3,718	**$24,563**	62
10	ASH/SPENT SORBENT HANDLING SYS	6,025	80	11,018	771		**$17,893**	1,431		2,930	**$22,254**	56
11	ACCESSORY ELECTRIC PLANT	9,095	2,830	7,720	540		**$20,185**	1,615		3,574	**$25,373**	64
12	INSTRUMENTATION & CONTROL	6,037		5,006	350		**$11,393**	911		1,917	**$14,222**	36
13	IMPROVEMENTS TO SITE	1,871	1,076	3,747	262		**$6,957**	557		2,254	**$9,767**	25
14	BUILDINGS & STRUCTURES		15,586	18,701	1,309		**$35,597**	2,848		9,611	**$48,055**	121
	TOTAL COST	**$198,778**	**$26,247**	**$126,383**	**$8,847**		**$360,255**	**$28,820**		**$59,765**	**$448,840**	**1129**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 07:54 AM

TOTAL PLANT COST SUMMARY

Case: Subcritical PC
Plant Size: 397.5 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
1.1	Coal Receive & Unload	1,711		941	66		$2,718	217		587	$3,522	9
1.2	Coal Stackout & Reclaim	2,211		604	42		$2,856	229		617	$3,702	9
1.3	Coal Conveyors & Yd Crush	2,055		597	42		$2,694	216		582	$3,492	9
1.4	Other Coal Handling	538		138	10		$686	55		148	$888	2
1.5	Sorbent Receive & Unload	71		26	2		$99	8		21	$129	0
1.6	Sorbent Stackout & Reclaim											
1.7	Sorbent Conveyors	412		122	9		$542	43		117	$702	2
1.8	Other Sorbent Handling											
1.9	Coal & Sorbent Hnd.Foundations		2,063	2,903	203		$5,169	414		1,117	$6,699	17
	SUBTOTAL 1.	**$6,997**	**$2,063**	**$5,331**	**$373**		**$14,764**	**$1,181**		**$3,189**	**$19,134**	**48**
2	COAL & SORBENT PREP & FEED											
2.1	Coal Crushing & Drying	969		227	16		$1,212	97		262	$1,571	4
2.2	Coal Conveyor / Storage	5,735		1,508	106		$7,348	588		1,587	$9,524	24
2.3	Coal Injection System											
2.4	Misc.Coal Prep & Feed											
2.5	Sorbent Prep Equipment	1,926		482	34		$2,442	195		527	$3,165	8
2.6	Sorbent Storage & Feed	159		530	37		$726	58		157	$941	2
2.7	Sorbent Injection System											
2.8	Booster Air Supply System											
2.9	Coal & Sorbent Feed Foundation											
	SUBTOTAL 2.	**$8,789**		**$2,748**	**$192**		**$11,729**	**$938**		**$2,533**	**$15,201**	**38**
3	FEEDWATER & MISC. BOP SYSTEMS											
3.1	FeedwaterSystem	4,520		1,436	101		$6,057	485		1,308	$7,849	20
3.2	Water Makeup & Pretreating	2,307		816	57		$3,180	254		1,030	$4,464	11
3.3	Other Feedwater Subsystems	3,476		1,236	87		$4,798	384		1,036	$6,218	16
3.4	Service Water Systems	443		270	19		$732	59		237	$1,028	3
3.5	Other Boiler Plant Systems	1,827		1,510	106		$3,443	275		744	$4,462	11
3.6	FO Supply Sys & Nat Gas	133		193	13		$339	27		73	$439	1
3.7	Waste Treatment Equipment	1,672		979	69		$2,720	218		881	$3,819	10
3.8	Misc. Power Plant Equipment	1,575		523	37		$2,134	171		691	$2,996	8
	SUBTOTAL 3.	**$15,953**		**$6,963**	**$487**		**$23,403**	**$1,872**		**$6,002**	**$31,276**	**79**
4	PC BOILER & ACCESSORIES											
4.1	PC Boiler	46,861		19,453	1,362		$67,676	5,414		7,309	$80,400	202
4.2	Open											
4.3	Open											
4.4	Boiler BoP (w/FD & ID Fans)	3,260		1,074	75		$4,410	353		476	$5,239	13
4.5	Primary Air System	w/4.1		w/4.1								
4.6	Secondary Air System	w/4.1		w/4.1								
4.8	Major Component Rigging		w/4.1	w/4.1								
4.9	PC Foundations		w/14.1	w/14.1								
	SUBTOTAL 4.	**$50,122**		**$20,528**	**$1,437**		**$72,086**	**$5,767**		**$7,785**	**$85,639**	**215**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 07:54 AM

TOTAL PLANT COST SUMMARY

Case: Subcritical PC
Plant Size: 397.5 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
5	FLUE GAS CLEANUP											
5.1	Absorber Vessels & Accessories	15,315		2,081	146		$17,541	1,403		1,894	$20,839	52
5.2	Other FGD	1,116		1,018	71		$2,206	176		238	$2,620	7
5.3	ESP & Accessories	12,124		4,161	291		$16,577	1,326		1,790	$19,693	50
5.4	Other Particulate Removal Materials	3,371		5,773	404		$9,548	764		1,031	$11,343	29
5.5	Gypsum Dewatering System	2,113		5,617	393		$8,123	650		877	$9,651	24
5.6	Mercury Removal System											
5.9	Open											
	SUBTOTAL 5.	**$34,039**		**$18,650**	**$1,306**		**$53,995**	**$4,320**		**$5,831**	**$64,146**	**161**
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	N/A		N/A								
6.2	Combustion Turbine Accessories	N/A		N/A								
6.3	Compressed Air Piping											
6.9	Combustion Turbine Foundations											
	SUBTOTAL 6.											
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	N/A		N/A								
7.2	HRSG Accessories											
7.3	Ductwork	4,605		3,614	253		$8,472	678		1,830	$10,980	28
7.4	Stack	5,198		3,290	230		$8,718	697		942	$10,357	26
7.9	HRSG,Duct & Stack Foundations		289	366	26		$681	54		221	$956	2
	SUBTOTAL 7.	**$9,803**	**$289**	**$7,270**	**$509**		**$17,871**	**$1,430**		**$2,992**	**$22,293**	**56**
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	30,684		5,055	354		$36,093	2,887		3,898	$42,879	108
8.2	Turbine Plant Auxiliaries	185		429	30		$645	52		70	$766	2
8.3	Condenser & Auxiliaries	4,775		1,321	92		$6,189	495		668	$7,353	18
8.4	Steam Piping	6,780		3,572	250		$10,601	848		2,290	$13,739	35
8.9	TG Foundations		358	1,117	78		$1,552	124		503	$2,179	5
	SUBTOTAL 8.	**$42,424**	**$358**	**$11,494**	**$805**		**$55,081**	**$4,406**		**$7,429**	**$66,916**	**168**
9	COOLING WATER SYSTEM											
9.1	Cooling Towers	6,150		1,364	96		$7,610	609		822	$9,040	23
9.2	Circulating Water Pumps	899		86	6		$991	79		107	$1,178	3
9.3	Circ.Water System Auxiliaries	110		16	1		$127	10		14	$150	0
9.4	Circ.Water Piping		2,132	2,397	168		$4,697	376		1,014	$6,087	15
9.5	Make-up Water System	245		366	26		$637	51		138	$825	2
9.6	Component Cooling Water Sys	220	263	195	14		$692	55		150	$897	2
9.9	Circ.Water System Foundations		1,570	2,783	195		$4,547	364		1,473	$6,384	16
	SUBTOTAL 9.	**$7,623**	**$3,966**	**$7,208**	**$505**		**$19,301**	**$1,544**		**$3,718**	**$24,563**	**62**
10	ASH/SPENT SORBENT HANDLING SYS											
10.1	Ash Coolers	N/A		N/A								
10.2	Cyclone Ash Letdown	N/A		N/A								
10.3	HGCU Ash Letdown	N/A		N/A								
10.4	High Temperature Ash Piping	N/A		N/A								
10.5	Other Ash Recovery Equipment	N/A		N/A								
10.6	Ash Storage Silos	173		576	40		$789	63		128	$980	2
10.7	Ash Transport & Feed Equipment	5,852		10,337	724		$16,913	1,353		2,740	$21,006	53
10.8	Misc. Ash Handling Equipment											
10.9	Ash/Spent Sorbent Foundation		80	105	7		$192	15		62	$269	1
	SUBTOTAL 10.	**$6,025**	**$80**	**$11,018**	**$771**		**$17,893**	**$1,431**		**$2,930**	**$22,254**	**56**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 07:54 AM

TOTAL PLANT COST SUMMARY

Case: Subcritical PC
Plant Size: 397.5 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
11	ACCESSORY ELECTRIC PLANT											
11.1	Generator Equipment	988		157	11		$1,156	93		125	$1,374	3
11.2	Station Service Equipment	2,678		861	60		$3,599	288		389	$4,276	11
11.3	Switchgear & Motor Control	2,135		355	25		$2,515	201		407	$3,123	8
11.4	Conduit & Cable Tray		1,287	4,039	283		$5,609	449		1,211	$7,269	18
11.5	Wire & Cable		1,382	1,380	97		$2,858	229		617	$3,704	9
11.6	Protective Equipment	105		351	25		$481	38		78	$598	2
11.7	Standby Equipment	654		15	1		$669	54		108	$831	2
11.8	Main Power Transformers	2,535		117	8		$2,660	213		431	$3,304	8
11.9	Electrical Foundations		161	445	31		$637	51		206	$894	2
	SUBTOTAL 11.	**$9,095**	**$2,830**	**$7,720**	**$540**		**$20,185**	**$1,615**		**$3,574**	**$25,373**	**64**
12	INSTRUMENTATION & CONTROL											
12.1	PC Control Equipment	w/12.7		w/12.7								
12.2	Combustion Turbine Control	N/A		N/A								
12.3	Steam Turbine Control	w/8.1		w/8.1								
12.4	Other Major Component Control											
12.5	Signal Processing Equipment	W/12.7		w/12.7								
12.6	Control Boards,Panels & Racks	115		67	5		$186	15		40	$242	1
12.7	Computer & Accessories	3,656		134	9		$3,799	304		410	$4,513	11
12.8	Instrument Wiring & Tubing	1,426		4,431	310		$6,167	493		1,332	$7,993	20
12.9	Other I & C Equipment	841		374	26		$1,241	99		134	$1,474	4
	SUBTOTAL 12.	**$6,037**		**$5,006**	**$350**		**$11,393**	**$911**		**$1,917**	**$14,222**	**36**
13	IMPROVEMENTS TO SITE											
13.1	Site Preparation		31	625	44		$700	56		227	$983	2
13.2	Site Improvements		1,044	1,289	90		$2,423	194		785	$3,402	9
13.3	Site Facilities	1,871		1,834	128		$3,833	307		1,242	$5,382	14
	SUBTOTAL 13.	**$1,871**	**$1,076**	**$3,747**	**$262**		**$6,957**	**$557**		**$2,254**	**$9,767**	**25**
14	BUILDINGS & STRUCTURES											
14.1	Boiler Building		10,880	11,399	798		$23,077	1,846		6,231	$31,154	78
14.2	Turbine Building		3,304	5,241	367		$8,912	713		2,406	$12,031	30
14.3	Administration Building		323	407	28		$758	61		205	$1,023	3
14.4	Circulation Water Pumphouse		23	22	2		$47	4		13	$63	0
14.5	Water Treatment Buildings		225	220	15		$461	37		124	$622	2
14.6	Machine Shop		288	230	16		$534	43		144	$721	2
14.7	Warehouse		195	233	16		$445	36		120	$600	2
14.8	Other Buildings & Structures		120	121	8		$249	20		67	$337	1
14.9	Waste Treating Building & Str.		229	828	58		$1,114	89		301	$1,504	4
	SUBTOTAL 14.		**$15,586**	**$18,701**	**$1,309**		**$35,597**	**$2,848**		**$9,611**	**$48,055**	**121**
	TOTAL COST	**$198,778**	**$26,247**	**$126,383**	**$8,847**		**$360,255**	**$28,820**		**$59,765**	**$448,840**	**1129**

CONTINGENCY FACTORS

Subcritical PC

Item/Description	Contingency Factors(%) %Process	%Project
COAL & SORBENT HANDLING		20.0
COAL & SORBENT PREP & FEED		20.0
FEEDWATER & MISC. BOP SYSTEMS		23.7
PC BOILER & ACCESSORIES		
PC Boiler		10.0
Open		
Open		
Boiler BoP (w/FD & ID Fans)		10.0
FLUE GAS CLEANUP		10.0
COMBUSTION TURBINE/ACCESSORIES		
Combustion Turbine Generator		
Combustion Turbine Accessories		
HRSG, DUCTING & STACK		
Heat Recovery Steam Generator		
HRSG Accessories, Ductwork and Stack		15.5
STEAM TURBINE GENERATOR		
Steam TG & Accessories		10.0
Turbine Plant Auxiliaries and Steam Piping		17.2
COOLING WATER SYSTEM		17.8
ASH/SPENT SORBENT HANDLING SYS		15.2
ACCESSORY ELECTRIC PLANT		16.4
INSTRUMENTATION & CONTROL		15.6
IMPROVEMENTS TO SITE		30.0
BUILDINGS & STRUCTURES		25.0

OPERATING LABOR REQUIREMENTS			
Subcritical PC			
Operating Labor Rate(base):	25.89	$/hour	
Operating Labor Burden:	30.00	% of base	
Labor O-H Charge Rate:	25.00	% of labor	
Operating Labor Requirements(O.J.)per Shift:			
Category	1 unit/mod.		Total Plant
Skilled Operator	2.0		2.0
Operator	9.0		9.0
Foreman	1.0		1.0
Lab Tech's, etc.	2.0		2.0
TOTAL-O.J.'s	14.0		14.0

CONSUMABLES, BY-PRODUCTS & FUELS DATA			
Subcritical PC			
Item/Description	Consumption Initial	/Day	Unit Cost
Water(/1000 gallons)		5,475	0.80
Chemicals*			
MU & WT Chem.(lbs)**	397,544	13,251	0.16
Limestone (ton)**	11,919	397.3	16.25
Formic Acid (lb)			0.60
Ammonia (NH3) ton			32.00
Other			
Supplemental Fuel(MBtu)**			
SCR Catalyst Replacement			1.00
L.P. Steam(/1000 pounds)			
Waste Disposal			
Sludge(ton)		833	
Ash(ton)		371	10.00
By-products & Emissions			
Total By-products			
Fuel(ton)		3,711	29.29

MAINTENANCE FACTORS

Subcritical PC

Item/Description	Maintenance %
COAL & SORBENT HANDLING	2.1
COAL & SORBENT PREP & FEED	3.7
FEEDWATER & MISC. BOP SYSTEMS	2.3
PC BOILER & ACCESSORIES	
PC Boiler	3.5
Open	
Open	
Boiler BoP (w/FD & ID Fans)	4.5
FLUE GAS CLEANUP	3.4
COMBUSTION TURBINE/ACCESSORIES	
Combustion Turbine Generator	
Combustion Turbine Accessories	
HRSG, DUCTING & STACK	
Heat Recovery Steam Generator	
HRSG Accessories, Ductwork and Stack	1.0
STEAM TURBINE GENERATOR	
Steam TG & Accessories	
Turbine Plant Auxiliaries and Steam Piping	3.8
COOLING WATER SYSTEM	1.2
ASH/SPENT SORBENT HANDLING SYS	3.0
ACCESSORY ELECTRIC PLANT	1.3
INSTRUMENTATION & CONTROL	1.6
IMPROVEMENTS TO SITE	0.6
BUILDINGS & STRUCTURES	1.4

Supercritical PC

CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY

TITLE/DEFINITION

Case:	Supercritical PC			
Plant Size:	401.8 (MW,net)	HeatRate:	8,568	(Btu/kWh)
Primary/Secondary Fuel(type):	Illnois #6	Cost:	1.26	($/MMBtu)
Design/Construction:	3 (years)	BookLife:	20	(years)
TPC(Plant Cost) Year:	1998 (Jan.)	TPI Year:	2005	(Jan.)
Capacity Factor:	85 (%)			

CAPITAL INVESTMENT		**$x1000**	**$/kW**
Process Capital & Facilities		379,761	945.1
Engineering(incl.C.M.,H.O.& Fee)		30,381	75.6
Process Contingency			
Project Contingency		61,347	152.7
TOTAL PLANT COST(TPC)		$471,489	1173.4
TOTAL CASH EXPENDED	$471,489		
AFDC	$23,575		
TOTAL PLANT INVESTMENT(TPI)		$495,064	1232.0
Royalty Allowance			
Preproduction Costs		12,392	30.8
Inventory Capital		4,231	10.5
Initial Catalyst & Chemicals(w/equip.)			
Land Cost		480	1.2
TOTAL CAPITAL REQUIREMENT(TCR)		$512,167	1274.6

OPERATING & MAINTENANCE COSTS (1998 Dollars)	**$x1000**	**$/kW-yr**
Operating Labor	4,127	10.3
Maintenance Labor	2,147	5.3
Maintenance Material	3,221	8.0
Administrative & Support Labor	1,569	3.9
TOTAL OPERATION & MAINTENANCE	$11,064	27.5
FIXED O & M	23.41	$/kW-yr
VARIABLE O & M	0.06	¢/kWh

CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars)	**$x1000**	**¢/kWh**
Water	1,247	0.04
Chemicals	3,008	0.10
Other Consumables	3,345	0.11
Waste Disposal	1,093	0.04
TOTAL CONSUMABLE OPERATING COSTS	$8,693	0.29

BY-PRODUCT CREDITS (1998 Dollars)

FUEL COST (1998 Dollars)	$32,176	1.08

	1st Year (2005 $)		**Levelized (10th.Year $)**	
PRODUCTION COST SUMMARY		**¢/kWh**		**¢/kWh**
Fixed O & M	23.4/kW-yr	0.31	23.4/kW-yr	0.31
Variable O & M		0.06		0.06
Consumables		0.29		0.29
By-product Credit				
Fuel		0.98		0.93
TOTAL PRODUCTION COST		1.64		1.59
LEVELIZED CARRYING CHARGES(Capital)			172.1/kW-yr	2.31
LEVELIZED (10th.Year) BUSBAR COST OF POWER				3.90

ESTIMATE BASIS/FINANCIAL CRITERIA for REVENUE REQUIREMENT CALCULATIONS

GENERAL DATA/CHARACTERISTICS

Case Title:	Supercritical PC			
Unit Size:/Plant Size:	401.8	MW,net	401.8	MWe
Location:	Middletown, USA			
Fuel: Primary/Secondary	Illnois #6			
Energy From Primary/Secondary Fuels	8,568	Btu/kWh		Btu/kWh
Levelized Capacity Factor / Preproduction(equivalent months):	85	%	1	months
Capital Cost Year Dollars (Reference Year Dollars):	1998	(January)		
Delivered Cost of Primary/Secondary Fuel	1.26	$/MBtu		$/MBtu
Design/Construction Period:	3	years		
Plant Startup Date (1st. Year Dollars):	2005	(January)		
Land Area/Unit Cost	320	acre	$1,500	/acre

FINANCIAL CRITERIA

Project Book Life:	20	years		
Book Salvage Value:		%		
Project Tax Life:	20	years		
Tax Depreciation Method:	Accel. based on ACRS Class			
Property Tax Rate:	1.0	% per year		
Insurance Tax Rate:	1.0	% per year		
Federal Income Tax Rate:	34.0	%		
State Income Tax Rate:	6.0	%		
Investment Tax Credit/% Eligible		%		%
Economic Basis:	10th.Year	Constant Dollars		

Capital Structure	% of Total	Cost(%)
Common Equity	20	16.5
Preferred Stock		
Debt	80	5.8
Weighted Cost of Capital:(after tax)		6.2 %

Escalation Rates	Over Book Life		1998 to 2005	
General		% per year		% per year
Primary Fuel	-1.1	% per year	-1.36	% per year
Secondary Fuel	1.2	% per year	0.041	% per year

Client: DEPARTMENT OF ENERGY
Project: Market Based Advanced Coal Power Systems
Report Date: 14-Aug-98
08:20 AM

TOTAL PLANT COST SUMMARY

Case: Supercritical PC
Plant Size: 401.8 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING	6,782	2,004	5,174	362		**$14,321**	1,146		3,093	**$18,560**	46
2	COAL & SORBENT PREP & FEED	8,458		2,633	184		**$11,275**	902		2,435	**$14,613**	36
3	FEEDWATER & MISC. BOP SYSTEMS	16,550		7,175	502		**$24,227**	1,938		6,139	**$32,304**	80
4	PC BOILER & ACCESSORIES											
4.1	PC Boiler	60,723		23,331	1,633		**$85,688**	6,855		9,254	**$101,797**	253
4.2	Open											
4.3	Open											
4.4-4.9	Boiler BoP (w/FD & ID Fans)	3,163		1,042	73		**$4,278**	342		462	**$5,082**	13
	SUBTOTAL 4	*63,886*		*24,373*	*1,706*		***$89,966***	*7,197*		*9,716*	***$106,879***	*266*
5	FLUE GAS CLEANUP	33,591		18,834	1,168		**$53,593**	4,287		5,433	**$63,314**	158
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	N/A		N/A								
6.2-6.9	Combustion Turbine Accessories											
	SUBTOTAL 6											
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	N/A		N/A								
7.2-7.9	HRSG Accessories, Ductwork and Stack	9,491	280	7,038	493		**$17,302**	1,384		2,897	**$21,583**	54
	SUBTOTAL 7	*9,491*	*280*	*7,038*	*493*		***$17,302***	*1,384*		*2,897*	***$21,583***	*54*
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	33,394		5,502	385		**$39,281**	3,143		4,242	**$46,666**	116
8.2-8.9	Turbine Plant Auxiliaries and Steam Pipin	11,839	361	6,493	455		**$19,147**	1,532		3,561	**$24,240**	60
	SUBTOTAL 8	*45,234*	*361*	*11,995*	*840*		***$58,429***	*4,674*		*7,803*	***$70,906***	*176*
9	COOLING WATER SYSTEM	7,685	3,998	7,266	509		**$19,457**	1,557		3,748	**$24,761**	62
10	ASH/SPENT SORBENT HANDLING SYS	5,859	77	10,715	750		**$17,402**	1,392		2,849	**$21,643**	54
11	ACCESSORY ELECTRIC PLANT	9,175	2,859	7,797	546		**$20,376**	1,630		3,608	**$25,614**	64
12	INSTRUMENTATION & CONTROL	6,114		5,069	355		**$11,538**	923		1,941	**$14,401**	36
13	IMPROVEMENTS TO SITE	1,882	1,082	3,768	264		**$6,995**	560		2,266	**$9,821**	24
14	BUILDINGS & STRUCTURES		15,275	18,323	1,283		**$34,881**	2,790		9,418	**$47,090**	117
	TOTAL COST	**$214,705**	**$25,935**	**$130,160**	**$8,961**		**$379,761**	**$30,381**		**$61,347**	**$471,489**	**1173**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 08:20 AM

TOTAL PLANT COST SUMMARY

Case: Supercritical PC
Plant Size: 401.8 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
1.1	Coal Receive & Unload	1,662		914	64		$2,640	211		570	$3,421	9
1.2	Coal Stackout & Reclaim	2,147		586	41		$2,775	222		599	$3,596	9
1.3	Coal Conveyors & Yd Crush	1,996		580	41		$2,617	209		565	$3,392	8
1.4	Other Coal Handling	522		134	9		$666	53		144	$863	2
1.5	Sorbent Receive & Unload	67		24	2		$93	7		20	$121	0
1.6	Sorbent Stackout & Reclaim											
1.7	Sorbent Conveyors	387		114	8		$509	41		110	$660	2
1.8	Other Sorbent Handling											
1.9	Coal & Sorbent Hnd.Foundations		2,004	2,820	197		$5,021	402		1,085	$6,507	16
	SUBTOTAL 1.	**$6,782**	**$2,004**	**$5,174**	**$362**		**$14,321**	**$1,146**		**$3,093**	**$18,560**	**46**
2	COAL & SORBENT PREP & FEED											
2.1	Coal Crushing & Drying	939		221	15		$1,175	94		254	$1,523	4
2.2	Coal Conveyor / Storage	5,560		1,462	102		$7,125	570		1,539	$9,233	23
2.3	Coal Injection System											
2.4	Misc.Coal Prep & Feed											
2.5	Sorbent Prep Equipment	1,809		453	32		$2,293	183		495	$2,972	7
2.6	Sorbent Storage & Feed	150		497	35		$682	55		147	$884	2
2.7	Sorbent Injection System											
2.8	Booster Air Supply System											
2.9	Coal & Sorbent Feed Foundation											
	SUBTOTAL 2.	**$8,458**		**$2,633**	**$184**		**$11,275**	**$902**		**$2,435**	**$14,613**	**36**
3	FEEDWATER & MISC. BOP SYSTEMS											
3.1	FeedwaterSystem	4,946		1,572	110		$6,628	530		1,432	$8,590	21
3.2	Water Makeup & Pretreating	2,170		767	54		$2,991	239		969	$4,199	10
3.3	Other Feedwater Subsystems	3,804		1,352	95		$5,251	420		1,134	$6,805	17
3.4	Service Water Systems	417		254	18		$689	55		223	$967	2
3.5	Other Boiler Plant Systems	1,921		1,588	111		$3,620	290		782	$4,692	12
3.6	FO Supply Sys & Nat Gas	134		194	14		$341	27		74	$442	1
3.7	Waste Treatment Equipment	1,573		921	64		$2,558	205		829	$3,592	9
3.8	Misc. Power Plant Equipment	1,586		526	37		$2,149	172		696	$3,017	8
	SUBTOTAL 3.	**$16,550**		**$7,175**	**$502**		**$24,227**	**$1,938**		**$6,139**	**$32,304**	**80**
4	PC BOILER & ACCESSORIES											
4.1	PC Boiler	60,723		23,331	1,633		$85,688	6,855		9,254	$101,797	253
4.2	Open											
4.3	Open											
4.4	Boiler BoP (w/FD & ID Fans)	3,163		1,042	73		$4,278	342		462	$5,082	13
4.5	Primary Air System	w/4.1		w/4.1								
4.6	Secondary Air System	w/4.1		w/4.1								
4.8	Major Component Rigging		w/4.1	w/4.1								
4.9	PC Foundations		w/14.1	w/14.1								
	SUBTOTAL 4.	**$63,886**		**$24,373**	**$1,706**		**$89,966**	**$7,197**		**$9,716**	**$106,879**	**266**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 08:20 AM

TOTAL PLANT COST SUMMARY

Case: Supercritical PC
Plant Size: 401.8 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
5	FLUE GAS CLEANUP											
5.1	Absorber Vessels & Accessories	16,227		2,205	154		$18,586	1,487		2,007	$22,080	55
5.2	Other FGD	1,182		1,079	76		$2,337	187		252	$2,776	7
5.3	Bag House & Accessories	10,204		3,502	245		$13,952	1,116		1,507	$16,575	41
5.4	Other Particulate Removal Materials	3,152		5,398	378		$8,928	714		964	$10,607	26
5.5	Gypsum Dewatering System	1,693		4,499	315		$6,507	521		703	$7,730	19
5.6	Mercury Removal System	1,132		2,150			$3,283	263			$3,545	9
5.9	Open											
	SUBTOTAL 5.	**$33,591**		**$18,834**	**$1,168**		**$53,593**	**$4,287**		**$5,433**	**$63,314**	**158**
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	N/A		N/A								
6.2	Combustion Turbine Accessories	N/A		N/A								
6.3	Compressed Air Piping											
6.9	Combustion Turbine Foundations											
	SUBTOTAL 6.											
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	N/A		N/A								
7.2	HRSG Accessories											
7.3	Ductwork	4,459		3,499	245		$8,202	656		1,772	$10,630	26
7.4	Stack	5,032		3,185	223		$8,440	675		912	$10,027	25
7.9	HRSG,Duct & Stack Foundations		280	355	25		$659	53		214	$926	2
	SUBTOTAL 7.	**$9,491**	**$280**	**$7,038**	**$493**		**$17,302**	**$1,384**		**$2,897**	**$21,583**	**54**
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	33,394		5,502	385		$39,281	3,143		4,242	$46,666	116
8.2	Turbine Plant Auxiliaries	187		433	30		$650	52		70	$773	2
8.3	Condenser & Auxiliaries	4,816		1,332	93		$6,241	499		674	$7,415	18
8.4	Steam Piping	6,837		3,602	252		$10,690	855		2,309	$13,855	34
8.9	TG Foundations		361	1,126	79		$1,565	125		507	$2,198	5
	SUBTOTAL 8.	**$45,234**	**$361**	**$11,995**	**$840**		**$58,429**	**$4,674**		**$7,803**	**$70,906**	**176**
9	COOLING WATER SYSTEM											
9.1	Cooling Towers	6,199		1,375	96		$7,671	614		828	$9,113	23
9.2	Circulating Water Pumps	906		87	6		$999	80		108	$1,187	3
9.3	Circ.Water System Auxiliaries	111		16	1		$128	10		14	$152	0
9.4	Circ.Water Piping		2,150	2,416	169		$4,735	379		1,023	$6,136	15
9.5	Make-up Water System	247		369	26		$642	51		139	$832	2
9.6	Component Cooling Water Sys	222	265	197	14		$698	56		151	$905	2
9.9	Circ.Water System Foundations		1,583	2,805	196		$4,584	367		1,485	$6,436	16
	SUBTOTAL 9.	**$7,685**	**$3,998**	**$7,266**	**$509**		**$19,457**	**$1,557**		**$3,748**	**$24,761**	**62**
10	ASH/SPENT SORBENT HANDLING SYS											
10.1	Ash Coolers	N/A		N/A								
10.2	Cyclone Ash Letdown	N/A		N/A								
10.3	HGCU Ash Letdown	N/A		N/A								
10.4	High Temperature Ash Piping	N/A		N/A								
10.5	Other Ash Recovery Equipment	N/A		N/A								
10.6	Ash Storage Silos	168		560	39		$767	61		124	$953	2
10.7	Ash Transport & Feed Equipment	5,691		10,053	704		$16,448	1,316		2,665	$20,429	51
10.8	Misc. Ash Handling Equipment											
10.9	Ash/Spent Sorbent Foundation		77	102	7		$186	15		60	$262	1
	SUBTOTAL 10.	**$5,859**	**$77**	**$10,715**	**$750**		**$17,402**	**$1,392**		**$2,849**	**$21,643**	**54**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 08:20 AM

TOTAL PLANT COST SUMMARY

Case: Supercritical PC
Plant Size: 401.8 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
11	ACCESSORY ELECTRIC PLANT											
11.1	Generator Equipment	995		158	11		$1,164	93		126	$1,383	3
11.2	Station Service Equipment	2,705		870	61		$3,636	291		393	$4,319	11
11.3	Switchgear & Motor Control	2,156		359	25		$2,540	203		412	$3,155	8
11.4	Conduit & Cable Tray		1,300	4,080	286		$5,666	453		1,224	$7,343	18
11.5	Wire & Cable		1,396	1,394	98		$2,887	231		624	$3,742	9
11.6	Protective Equipment	107		355	25		$486	39		79	$603	2
11.7	Standby Equipment	657		15	1		$673	54		109	$836	2
11.8	Main Power Transformers	2,555		118	8		$2,682	215		434	$3,331	8
11.9	Electrical Foundations		162	448	31		$642	51		208	$902	2
	SUBTOTAL 11.	**$9,175**	**$2,859**	**$7,797**	**$546**		**$20,376**	**$1,630**		**$3,608**	**$25,614**	**64**
12	INSTRUMENTATION & CONTROL											
12.1	PC Control Equipment	w/12.7		w/12.7								
12.2	Combustion Turbine Control	N/A		N/A								
12.3	Steam Turbine Control	w/8.1		w/8.1								
12.4	Other Major Component Control											
12.5	Signal Processing Equipment	W/12.7		w/12.7								
12.6	Control Boards,Panels & Racks	116		68	5		$189	15		41	$245	1
12.7	Computer & Accessories	3,702		136	9		$3,847	308		415	$4,570	11
12.8	Instrument Wiring & Tubing	1,444		4,487	314		$6,245	500		1,349	$8,094	20
12.9	Other I & C Equipment	852		378	26		$1,257	101		136	$1,493	4
	SUBTOTAL 12.	**$6,114**		**$5,069**	**$355**		**$11,538**	**$923**		**$1,941**	**$14,401**	**36**
13	IMPROVEMENTS TO SITE											
13.1	Site Preparation		32	628	44		$704	56		228	$989	2
13.2	Site Improvements		1,050	1,296	91		$2,436	195		789	$3,421	9
13.3	Site Facilities	1,882		1,844	129		$3,854	308		1,249	$5,411	13
	SUBTOTAL 13.	**$1,882**	**$1,082**	**$3,768**	**$264**		**$6,995**	**$560**		**$2,266**	**$9,821**	**24**
14	BUILDINGS & STRUCTURES											
14.1	Boiler Building		10,664	11,172	782		$22,618	1,809		6,107	$30,535	76
14.2	Turbine Building		3,204	5,082	356		$8,642	691		2,333	$11,666	29
14.3	Administration Building		324	408	29		$761	61		205	$1,027	3
14.4	Circulation Water Pumphouse		23	22	2		$47	4		13	$63	0
14.5	Water Treatment Buildings		226	221	15		$462	37		125	$624	2
14.6	Machine Shop		289	231	16		$536	43		145	$724	2
14.7	Warehouse		196	234	16		$446	36		120	$602	1
14.8	Other Buildings & Structures		120	122	9		$250	20		68	$338	1
14.9	Waste Treating Building & Str.		230	831	58		$1,119	89		302	$1,510	4
	SUBTOTAL 14.		**$15,275**	**$18,323**	**$1,283**		**$34,881**	**$2,790**		**$9,418**	**$47,090**	**117**
	TOTAL COST	**$214,705**	**$25,935**	**$130,160**	**$8,961**		**$379,761**	**$30,381**		**$61,347**	**$471,489**	**1173**

CONTINGENCY FACTORS

Supercritical PC

Item/Description	Contingency Factors(%) %Process	%Project
COAL & SORBENT HANDLING		20.0
COAL & SORBENT PREP & FEED		20.0
FEEDWATER & MISC. BOP SYSTEMS		23.5
PC BOILER & ACCESSORIES		
PC Boiler		10.0
Open		
Open		
Boiler BoP (w/FD & ID Fans)		10.0
FLUE GAS CLEANUP		9.4
COMBUSTION TURBINE/ACCESSORIES		
Combustion Turbine Generator		
Combustion Turbine Accessories		
HRSG, DUCTING & STACK		
Heat Recovery Steam Generator		
HRSG Accessories, Ductwork and Stack		15.5
STEAM TURBINE GENERATOR		
Steam TG & Accessories		10.0
Turbine Plant Auxiliaries and Steam Piping		17.2
COOLING WATER SYSTEM		17.8
ASH/SPENT SORBENT HANDLING SYS		15.2
ACCESSORY ELECTRIC PLANT		16.4
INSTRUMENTATION & CONTROL		15.6
IMPROVEMENTS TO SITE		30.0
BUILDINGS & STRUCTURES		25.0

OPERATING LABOR REQUIREMENTS			
Supercritical PC			
Operating Labor Rate(base):	25.89	$/hour	
Operating Labor Burden:	30.00	% of base	
Labor O-H Charge Rate:	25.00	% of labor	
Operating Labor Requirements(O.J.)per Shift:			
Category	1 unit/mod.		Total Plant
Skilled Operator	2.0		2.0
Operator	9.0		9.0
Foreman	1.0		1.0
Lab Tech's, etc.	2.0		2.0
TOTAL-O.J.'s	14.0		14.0

CONSUMABLES, BY-PRODUCTS & FUELS DATA			
Supercritical PC			
Item/Description	Consumption Initial	/Day	Unit Cost
Water(/1000 gallons)		5,022	0.80
Chemicals*			
MU & WT Chem.(lbs)**	364,670	12,156	0.16
Limestone (ton)**	10,822	360.7	16.25
Formic Acid (lb)	14,400	480.0	0.60
Ammonia (NH3) ton	1,548	51.6	32.00
Other			
Supplemental Fuel(MBtu)**			
SCR Catalyst Replacement		10,782	1.00
L.P. Steam(/1000 pounds)			
Waste Disposal			
Sludge(ton)		535	
Ash(ton)		352	10.00
By-products & Emissions			
Total By-products			
Fuel(ton)		3,541	29.29

MAINTENANCE FACTORS

Supercritical PC

Item/Description	Maintenance %
COAL & SORBENT HANDLING	2.1
COAL & SORBENT PREP & FEED	3.7
FEEDWATER & MISC. BOP SYSTEMS	2.3
PC BOILER & ACCESSORIES	
PC Boiler	3.5
Open	
Open	
Boiler BoP (w/FD & ID Fans)	4.5
FLUE GAS CLEANUP	3.4
COMBUSTION TURBINE/ACCESSORIES	
Combustion Turbine Generator	
Combustion Turbine Accessories	
HRSG, DUCTING & STACK	
Heat Recovery Steam Generator	
HRSG Accessories, Ductwork and Stack	1.0
STEAM TURBINE GENERATOR	
Steam TG & Accessories	
Turbine Plant Auxiliaries and Steam Piping	4.1
COOLING WATER SYSTEM	1.2
ASH/SPENT SORBENT HANDLING SYS	3.0
ACCESSORY ELECTRIC PLANT	1.3
INSTRUMENTATION & CONTROL	1.6
IMPROVEMENTS TO SITE	0.6
BUILDINGS & STRUCTURES	1.4

Ultracritical PC

CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY

TITLE/DEFINITION

Case:	Ultracritical PC			
Plant Size:	399.7 (MW,net)	HeatRate:	8,251	(Btu/kWh)
Primary/Secondary Fuel(type):	Illnois #6	Cost:	1.26	($/MMBtu)
Design/Construction:	3 (years)	BookLife:	20	(years)
TPC(Plant Cost) Year:	1998 (Jan.)	TPI Year:	2005	(Jan.)
Capacity Factor:	85 (%)			

CAPITAL INVESTMENT		**$x1000**	**$/kW**
Process Capital & Facilities		376,805	942.8
Engineering(incl.C.M.,H.O.& Fee)		30,144	75.4
Process Contingency			
Project Contingency		60,825	152.2
TOTAL PLANT COST(TPC)		$467,774	1170.4
TOTAL CASH EXPENDED	$467,774		
AFDC	$23,390		
TOTAL PLANT INVESTMENT(TPI)		$491,164	1229.0
Royalty Allowance			
Preproduction Costs		11,890	29.7
Inventory Capital		4,054	10.1
Initial Catalyst & Chemicals(w/equip.)			
Land Cost		480	1.2
TOTAL CAPITAL REQUIREMENT(TCR)		$507,588	1270.0

OPERATING & MAINTENANCE COSTS (1998 Dollars)	**$x1000**	**$/kW-yr**
Operating Labor	4,127	10.3
Maintenance Labor	2,120	5.3
Maintenance Material	3,180	8.0
Administrative & Support Labor	1,562	3.9
TOTAL OPERATION & MAINTENANCE	$10,989	27.5

FIXED O & M	23.37	$/kW-yr
VARIABLE O & M	0.06	¢/kWh

CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars)	**$x1000**	**¢/kWh**
Water	1,148	0.04
Chemicals	2,540	0.09
Other Consumables		
Waste Disposal	1,047	0.04
TOTAL CONSUMABLE OPERATING COSTS	$4,735	0.16

BY-PRODUCT CREDITS (1998 Dollars)

FUEL COST (1998 Dollars)		
	$30,819	1.04

	1st Year (2005 $)		**Levelized (10th.Year $)**	
PRODUCTION COST SUMMARY		**¢/kWh**		**¢/kWh**
Fixed O & M	23.4/kW-yr	0.31	23.4/kW-yr	0.31
Variable O & M		0.06		0.06
Consumables		0.16		0.16
By-product Credit				
Fuel		0.94		0.89
TOTAL PRODUCTION COST		1.47		1.42
LEVELIZED CARRYING CHARGES(Capital)			171.5/kW-yr	2.30
LEVELIZED (10th.Year) BUSBAR COST OF POWER				3.72

ESTIMATE BASIS/FINANCIAL CRITERIA for REVENUE REQUIREMENT CALCULATIONS

GENERAL DATA/CHARACTERISTICS

Case Title:	Ultracritical PC			
Unit Size:/Plant Size:	399.7	MW,net	399.7	MWe
Location:	Middletown, USA			
Fuel: Primary/Secondary	Illnois #6			
Energy From Primary/Secondary Fuels	8,251	Btu/kWh		Btu/kWh
Levelized Capacity Factor / Preproduction(equivalent months):	85	%	1	months
Capital Cost Year Dollars (Reference Year Dollars):	1998	(January)		
Delivered Cost of Primary/Secondary Fuel	1.26	$/MBtu		$/MBtu
Design/Construction Period:	3	years		
Plant Startup Date (1st. Year Dollars):	2005	(January)		
Land Area/Unit Cost	320	acre	$1,500	/acre

FINANCIAL CRITERIA

Project Book Life:	20	years		
Book Salvage Value:		%		
Project Tax Life:	20	years		
Tax Depreciation Method:	Accel. based on ACRS Class			
Property Tax Rate:	1.0	% per year		
Insurance Tax Rate:	1.0	% per year		
Federal Income Tax Rate:	34.0	%		
State Income Tax Rate:	6.0	%		
Investment Tax Credit/% Eligible		%		%
Economic Basis:	10th.Year	Constant Dollars		

Capital Structure	% of Total	Cost(%)
Common Equity	20	16.5
Preferred Stock		
Debt	80	5.8
Weighted Cost of Capital:(after tax)		6.2 %

Escalation Rates	Over Book Life		1998 to 2005	
General		% per year		% per year
Primary Fuel	-1.1	% per year	-1.36	% per year
Secondary Fuel	1.2	% per year	0.041	% per year

Client: DEPARTMENT OF ENERGY
Project: Market Based Advanced Coal Power Systems
Report Date: 14-Aug-98
08:24 AM

TOTAL PLANT COST SUMMARY

Case: Ultracritical PC
Plant Size: 399.7 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING	6,617	1,951	5,042	353		**$13,962**	1,117		3,016	**$18,095**	45
2	COAL & SORBENT PREP & FEED	8,283		2,590	181		**$11,054**	884		2,388	**$14,326**	36
3	FEEDWATER & MISC. BOP SYSTEMS	16,924		7,397	518		**$24,839**	1,987		6,232	**$33,059**	83
4	PC BOILER & ACCESSORIES											
4.1	PC Boiler	58,543		23,892	1,672		**$84,107**	6,729		9,084	**$99,919**	250
4.2	Open											
4.3	Open											
4.4-4.9	Boiler BoP (w/FD & ID Fans)	3,076		1,014	71		**$4,160**	333		449	**$4,942**	12
	SUBTOTAL 4	*61,618*		*24,906*	*1,743*		***$88,267***	*7,061*		*9,533*	***$104,861***	*262*
5	FLUE GAS CLEANUP	32,690		18,332	1,137		**$52,159**	4,173		5,289	**$61,621**	154
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	N/A		N/A								
6.2-6.9	Combustion Turbine Accessories											
	SUBTOTAL 6											
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	N/A		N/A								
7.2-7.9	HRSG Accessories, Ductwork and Stack	9,202	271	6,824	478		**$16,774**	1,342		2,809	**$20,925**	52
	SUBTOTAL 7	*9,202*	*271*	*6,824*	*478*		***$16,774***	*1,342*		*2,809*	***$20,925***	*52*
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	34,999		5,766	404		**$41,169**	3,294		4,446	**$48,909**	122
8.2-8.9	Turbine Plant Auxiliaries and Steam Pipin	11,797	359	6,470	453		**$19,079**	1,526		3,548	**$24,153**	60
	SUBTOTAL 8	*46,796*	*359*	*12,236*	*857*		***$60,248***	*4,820*		*7,994*	***$73,062***	*183*
9	COOLING WATER SYSTEM	7,658	3,984	7,241	507		**$19,390**	1,551		3,735	**$24,676**	62
10	ASH/SPENT SORBENT HANDLING SYS	5,721	76	10,462	732		**$16,991**	1,359		2,782	**$21,132**	53
11	ACCESSORY ELECTRIC PLANT	9,164	2,859	7,797	546		**$20,365**	1,629		3,606	**$25,600**	64
12	INSTRUMENTATION & CONTROL	6,138		5,089	356		**$11,584**	927		1,949	**$14,459**	36
13	IMPROVEMENTS TO SITE	1,877	1,079	3,759	263		**$6,978**	558		2,261	**$9,798**	25
14	BUILDINGS & STRUCTURES		14,976	17,960	1,257		**$34,193**	2,735		9,232	**$46,161**	115
	TOTAL COST	**$212,688**	**$25,555**	**$129,634**	**$8,928**		**$376,805**	**$30,144**		**$60,825**	**$467,774**	**1170**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 08:24 AM

TOTAL PLANT COST SUMMARY

Case: Ultracritical PC
Plant Size: 399.7 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
1.1	Coal Receive & Unload	1,618		890	62		$2,570	206		555	$3,331	8
1.2	Coal Stackout & Reclaim	2,091		571	40		$2,702	216		584	$3,501	9
1.3	Coal Conveyors & Yd Crush	1,944		565	40		$2,548	204		550	$3,302	8
1.4	Other Coal Handling	509		131	9		$648	52		140	$840	2
1.5	Sorbent Receive & Unload	67		24	2		$94	7		20	$121	0
1.6	Sorbent Stackout & Reclaim											
1.7	Sorbent Conveyors	388		115	8		$511	41		110	$662	2
1.8	Other Sorbent Handling											
1.9	Coal & Sorbent Hnd.Foundations		1,951	2,746	192		$4,889	391		1,056	$6,336	16
	SUBTOTAL 1.	**$6,617**	**$1,951**	**$5,042**	**$353**		**$13,962**	**$1,117**		**$3,016**	**$18,095**	**45**
2	COAL & SORBENT PREP & FEED											
2.1	Coal Crushing & Drying	913		214	15		$1,142	91		247	$1,480	4
2.2	Coal Conveyor / Storage	5,404		1,421	99		$6,925	554		1,496	$8,975	22
2.3	Coal Injection System											
2.4	Misc.Coal Prep & Feed											
2.5	Sorbent Prep Equipment	1,816		454	32		$2,302	184		497	$2,983	7
2.6	Sorbent Storage & Feed	150		499	35		$685	55		148	$887	2
2.7	Sorbent Injection System											
2.8	Booster Air Supply System											
2.9	Coal & Sorbent Feed Foundation											
	SUBTOTAL 2.	**$8,283**		**$2,590**	**$181**		**$11,054**	**$884**		**$2,388**	**$14,326**	**36**
3	FEEDWATER & MISC. BOP SYSTEMS											
3.1	FeedwaterSystem	5,145		1,635	114		$6,894	552		1,489	$8,935	22
3.2	Water Makeup & Pretreating	2,047		724	51		$2,821	226		914	$3,961	10
3.3	Other Feedwater Subsystems	3,957		1,407	98		$5,462	437		1,180	$7,079	18
3.4	Service Water Systems	393		240	17		$650	52		211	$912	2
3.5	Other Boiler Plant Systems	2,185		1,806	126		$4,117	329		889	$5,336	13
3.6	FO Supply Sys & Nat Gas	133		193	14		$340	27		73	$441	1
3.7	Waste Treatment Equipment	1,483		869	61		$2,413	193		782	$3,388	8
3.8	Misc. Power Plant Equipment	1,581		525	37		$2,142	171		694	$3,008	8
	SUBTOTAL 3.	**$16,924**		**$7,397**	**$518**		**$24,839**	**$1,987**		**$6,232**	**$33,059**	**83**
4	PC BOILER & ACCESSORIES											
4.1	PC Boiler	58,543		23,892	1,672		$84,107	6,729		9,084	$99,919	250
4.2	Open											
4.3	Open											
4.4	Boiler BoP (w/FD & ID Fans)	3,076		1,014	71		$4,160	333		449	$4,942	12
4.5	Primary Air System	w/4.1		w/4.1								
4.6	Secondary Air System	w/4.1		w/4.1								
4.8	Major Component Rigging		w/4.1	w/4.1								
4.9	PC Foundations		w/14.1	w/14.1								
	SUBTOTAL 4.	**$61,618**		**$24,906**	**$1,743**		**$88,267**	**$7,061**		**$9,533**	**$104,861**	**262**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 08:24 AM

TOTAL PLANT COST SUMMARY

Case: Ultracritical PC
Plant Size: 399.7 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
5	FLUE GAS CLEANUP											
5.1	Absorber Vessels & Accessories	15,813		2,148	150		$18,112	1,449		1,956	$21,517	54
5.2	Other FGD	1,152		1,052	74		$2,277	182		246	$2,705	7
5.3	Bag House & Accessories	9,908		3,401	238		$13,547	1,084		1,463	$16,094	40
5.4	Other Particulate Removal Materials	3,061		5,242	367		$8,669	694		936	$10,299	26
5.5	Gypsum Dewatering System	1,656		4,403	308		$6,368	509		688	$7,565	19
5.6	Mercury Removal System	1,099		2,086			$3,185	255			$3,440	9
5.9	Open											
	SUBTOTAL 5.	**$32,690**		**$18,332**	**$1,137**		**$52,159**	**$4,173**		**$5,289**	**$61,621**	**154**
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	N/A		N/A								
6.2	Combustion Turbine Accessories	N/A		N/A								
6.3	Compressed Air Piping											
6.9	Combustion Turbine Foundations											
	SUBTOTAL 6.											
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	N/A		N/A								
7.2	HRSG Accessories											
7.3	Ductwork	4,323		3,392	237		$7,952	636		1,718	$10,306	26
7.4	Stack	4,879		3,088	216		$8,183	655		884	$9,721	24
7.9	HRSG,Duct & Stack Foundations		271	344	24		$639	51		207	$898	2
	SUBTOTAL 7.	**$9,202**	**$271**	**$6,824**	**$478**		**$16,774**	**$1,342**		**$2,809**	**$20,925**	**52**
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	34,999		5,766	404		$41,169	3,294		4,446	$48,909	122
8.2	Turbine Plant Auxiliaries	186		431	30		$648	52		70	$770	2
8.3	Condenser & Auxiliaries	4,798		1,328	93		$6,219	498		672	$7,388	18
8.4	Steam Piping	6,812		3,589	251		$10,652	852		2,301	$13,805	35
8.9	TG Foundations		359	1,122	79		$1,560	125		505	$2,190	5
	SUBTOTAL 8.	**$46,796**	**$359**	**$12,236**	**$857**		**$60,248**	**$4,820**		**$7,994**	**$73,062**	**183**
9	COOLING WATER SYSTEM											
9.1	Cooling Towers	6,178		1,371	96		$7,645	612		826	$9,082	23
9.2	Circulating Water Pumps	903		87	6		$996	80		108	$1,183	3
9.3	Circ.Water System Auxiliaries	110		16	1		$127	10		14	$151	0
9.4	Circ.Water Piping		2,142	2,408	169		$4,718	377		1,019	$6,115	15
9.5	Make-up Water System	246		368	26		$640	51		138	$829	2
9.6	Component Cooling Water Sys	221	265	196	14		$696	56		150	$902	2
9.9	Circ.Water System Foundations		1,577	2,795	196		$4,568	365		1,480	$6,414	16
	SUBTOTAL 9.	**$7,658**	**$3,984**	**$7,241**	**$507**		**$19,390**	**$1,551**		**$3,735**	**$24,676**	**62**
10	ASH/SPENT SORBENT HANDLING SYS											
10.1	Ash Coolers	N/A		N/A								
10.2	Cyclone Ash Letdown	N/A		N/A								
10.3	HGCU Ash Letdown	N/A		N/A								
10.4	High Temperature Ash Piping	N/A		N/A								
10.5	Other Ash Recovery Equipment	N/A		N/A								
10.6	Ash Storage Silos	164		547	38		$749	60		121	$930	2
10.7	Ash Transport & Feed Equipment	5,557		9,816	687		$16,060	1,285		2,602	$19,946	50
10.8	Misc. Ash Handling Equipment											
10.9	Ash/Spent Sorbent Foundation		76	99	7		$182	15		59	$255	1
	SUBTOTAL 10.	**$5,721**	**$76**	**$10,462**	**$732**		**$16,991**	**$1,359**		**$2,782**	**$21,132**	**53**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 08:24 AM

TOTAL PLANT COST SUMMARY

Case: Ultracritical PC
Plant Size: 399.7 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
11	ACCESSORY ELECTRIC PLANT											
11.1	Generator Equipment	992		158	11		$1,161	93		125	$1,379	3
11.2	Station Service Equipment	2,706		870	61		$3,637	291		393	$4,321	11
11.3	Switchgear & Motor Control	2,157		359	25		$2,541	203		412	$3,156	8
11.4	Conduit & Cable Tray		1,301	4,081	286		$5,668	453		1,224	$7,346	18
11.5	Wire & Cable		1,396	1,395	98		$2,889	231		624	$3,744	9
11.6	Protective Equipment	106		354	25		$486	39		79	$603	2
11.7	Standby Equipment	656		15	1		$671	54		109	$834	2
11.8	Main Power Transformers	2,546		118	8		$2,673	214		433	$3,319	8
11.9	Electrical Foundations		162	447	31		$640	51		207	$898	2
	SUBTOTAL 11.	**$9,164**	**$2,859**	**$7,797**	**$546**		**$20,365**	**$1,629**		**$3,606**	**$25,600**	**64**
12	INSTRUMENTATION & CONTROL											
12.1	PC Control Equipment	w/12.7		w/12.7								
12.2	Combustion Turbine Control	N/A		N/A								
12.3	Steam Turbine Control	w/8.1		w/8.1								
12.4	Other Major Component Control											
12.5	Signal Processing Equipment	W/12.7		w/12.7								
12.6	Control Boards,Panels & Racks	116		68	5		$190	15		41	$246	1
12.7	Computer & Accessories	3,716		136	10		$3,862	309		417	$4,588	11
12.8	Instrument Wiring & Tubing	1,450		4,505	315		$6,270	502		1,354	$8,126	20
12.9	Other I & C Equipment	855		380	27		$1,262	101		136	$1,499	4
	SUBTOTAL 12.	**$6,138**		**$5,089**	**$356**		**$11,584**	**$927**		**$1,949**	**$14,459**	**36**
13	IMPROVEMENTS TO SITE											
13.1	Site Preparation		32	627	44		$702	56		228	$986	2
13.2	Site Improvements		1,047	1,293	90		$2,431	194		788	$3,413	9
13.3	Site Facilities	1,877		1,839	129		$3,845	308		1,246	$5,399	14
	SUBTOTAL 13.	**$1,877**	**$1,079**	**$3,759**	**$263**		**$6,978**	**$558**		**$2,261**	**$9,798**	**25**
14	BUILDINGS & STRUCTURES											
14.1	Boiler Building		10,456	10,955	767		$22,178	1,774		5,988	$29,941	75
14.2	Turbine Building		3,114	4,940	346		$8,400	672		2,268	$11,339	28
14.3	Administration Building		324	408	29		$760	61		205	$1,025	3
14.4	Circulation Water Pumphouse		23	22	2		$47	4		13	$63	0
14.5	Water Treatment Buildings		225	221	15		$462	37		125	$623	2
14.6	Machine Shop		288	231	16		$536	43		145	$723	2
14.7	Warehouse		196	234	16		$445	36		120	$601	2
14.8	Other Buildings & Structures		120	122	9		$250	20		67	$337	1
14.9	Waste Treating Building & Str.		229	829	58		$1,117	89		302	$1,508	4
	SUBTOTAL 14.		**$14,976**	**$17,960**	**$1,257**		**$34,193**	**$2,735**		**$9,232**	**$46,161**	**115**
	TOTAL COST	**$212,688**	**$25,555**	**$129,634**	**$8,928**		**$376,805**	**$30,144**		**$60,825**	**$467,774**	**1170**

CONTINGENCY FACTORS

Ultracritical PC

Item/Description	Contingency Factors(%) %Process	%Project
COAL & SORBENT HANDLING		20.0
COAL & SORBENT PREP & FEED		20.0
FEEDWATER & MISC. BOP SYSTEMS		23.2
PC BOILER & ACCESSORIES		
PC Boiler		10.0
Open		
Open		
Boiler BoP (w/FD & ID Fans)		10.0
FLUE GAS CLEANUP		9.4
COMBUSTION TURBINE/ACCESSORIES		
Combustion Turbine Generator		
Combustion Turbine Accessories		
HRSG, DUCTING & STACK		
Heat Recovery Steam Generator		
HRSG Accessories, Ductwork and Stack		15.5
STEAM TURBINE GENERATOR		
Steam TG & Accessories		10.0
Turbine Plant Auxiliaries and Steam Piping		17.2
COOLING WATER SYSTEM		17.8
ASH/SPENT SORBENT HANDLING SYS		15.2
ACCESSORY ELECTRIC PLANT		16.4
INSTRUMENTATION & CONTROL		15.6
IMPROVEMENTS TO SITE		30.0
BUILDINGS & STRUCTURES		25.0

OPERATING LABOR REQUIREMENTS			
Ultracritical PC			
Operating Labor Rate(base):	25.89	$/hour	
Operating Labor Burden:	30.00	% of base	
Labor O-H Charge Rate:	25.00	% of labor	
Operating Labor Requirements(O.J.)per Shift:			
Category	1 unit/mod.		Total Plant
Skilled Operator	2.0		2.0
Operator	9.0		9.0
Foreman	1.0		1.0
Lab Tech's, etc.	2.0		2.0
TOTAL-O.J.'s	14.0		14.0

CONSUMABLES, BY-PRODUCTS & FUELS DATA			
Ultracritical PC			
Item/Description	Consumption Initial	/Day	Unit Cost
Water(/1000 gallons)		4,625	0.80
Chemicals*			
MU & WT Chem.(lbs)**	335,843	11,195	0.16
Limestone (ton)**	10,885	362.8	16.25
Formic Acid (lb)	14,400	480.0	0.60
Ammonia (NH3) ton	244	8.1	32.00
Other			
Supplemental Fuel(MBtu)**			
SCR Catalyst Replacement			1.00
L.P. Steam(/1000 pounds)			
Waste Disposal			
Sludge(ton)		512	
Ash(ton)		338	10.00
By-products & Emissions			
Total By-products			
Fuel(ton)		3,392	29.29

MAINTENANCE FACTORS

Ultracritical PC

Item/Description	Maintenance %
COAL & SORBENT HANDLING	2.1
COAL & SORBENT PREP & FEED	3.7
FEEDWATER & MISC. BOP SYSTEMS	2.2
PC BOILER & ACCESSORIES	
PC Boiler	3.5
Open	
Open	
Boiler BoP (w/FD & ID Fans)	4.5
FLUE GAS CLEANUP	3.4
COMBUSTION TURBINE/ACCESSORIES	
Combustion Turbine Generator	
Combustion Turbine Accessories	
HRSG, DUCTING & STACK	
Heat Recovery Steam Generator	
HRSG Accessories, Ductwork and Stack	1.0
STEAM TURBINE GENERATOR	
Steam TG & Accessories	
Turbine Plant Auxiliaries and Steam Piping	4.2
COOLING WATER SYSTEM	1.2
ASH/SPENT SORBENT HANDLING SYS	3.0
ACCESSORY ELECTRIC PLANT	1.3
INSTRUMENTATION & CONTROL	1.6
IMPROVEMENTS TO SITE	0.6
BUILDINGS & STRUCTURES	1.4

FOAK Oxygen-Blown IGCC

CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY

TITLE/DEFINITION

Case:	Destec (2000-90/10)			
Plant Size:	543.2 (MW,net)	HeatRate:	8,522	(Btu/kWh)
Primary/Secondary Fuel(type):	Illnois #6	Cost:	1.26	($/MMBtu)
Design/Construction:	3.5 (years)	BookLife:	20	(years)
TPC(Plant Cost) Year:	1998 (Jan.)	TPI Year:	2005	(Jan.)
Capacity Factor:	85 (%)			

CAPITAL INVESTMENT		**$x1000**	**$/kW**
Process Capital & Facilities		534,667	984.3
Engineering(incl.C.M.,H.O.& Fee)		42,773	78.7
Process Contingency		14,090	25.9
Project Contingency		82,746	152.3
TOTAL PLANT COST(TPC)		$674,276	1241.3
TOTAL CASH EXPENDED	$674,276		
AFDC	$67,402		
TOTAL PLANT INVESTMENT(TPI)		$741,678	1365.4
Royalty Allowance			
Preproduction Costs		17,829	32.8
Inventory Capital		5,658	10.4
Initial Catalyst & Chemicals(w/equip.)			
Land Cost		450	0.8
TOTAL CAPITAL REQUIREMENT(TCR)		$765,615	1409.5

OPERATING & MAINTENANCE COSTS (1998 Dollars)	**$x1000**	**$/kW-yr**
Operating Labor	5,306	9.8
Maintenance Labor	4,859	8.9
Maintenance Material	7,288	13.4
Administrative & Support Labor	2,541	4.7
TOTAL OPERATION & MAINTENANCE	$19,995	36.8
FIXED O & M	31.29	$/kW-yr
VARIABLE O & M	0.07	¢/kWh

CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars)	**$x1000**	**¢/kWh**
Water	1,188	0.03
Chemicals	1,065	0.03
Other Consumables		
Waste Disposal	1,480	0.04
TOTAL CONSUMABLE OPERATING COSTS	$3,733	0.09
BY-PRODUCT CREDITS (1998 Dollars)	($7,605)	-0.19
FUEL COST (1998 Dollars)	$43,263	1.07

	1st Year (2005 $)		**Levelized (10th.Year $)**	
PRODUCTION COST SUMMARY		**¢/kWh**		**¢/kWh**
Fixed O & M	31.3/kW-yr	0.42	31.3/kW-yr	0.42
Variable O & M		0.07		0.07
Consumables		0.09		0.09
By-product Credit		-0.19		-0.19
Fuel		0.97		0.92
TOTAL PRODUCTION COST		1.37		1.32
LEVELIZED CARRYING CHARGES(Capital)			190.3/kW-yr	2.56
LEVELIZED (10th.Year) BUSBAR COST OF POWER				3.88

ESTIMATE BASIS/FINANCIAL CRITERIA for REVENUE REQUIREMENT CALCULATIONS

GENERAL DATA/CHARACTERISTICS

Case Title:	Destec (2000-90/10)			
Unit Size:/Plant Size:	543.2	MW,net	543.2	MWe
Location:	Middletown, USA			
Fuel: Primary/Secondary	Illnois #6			
Energy From Primary/Secondary Fuels	8,522	Btu/kWh		Btu/kWh
Levelized Capacity Factor / Preproduction(equivalent months):	85	%	1	months
Capital Cost Year Dollars (Reference Year Dollars):	1998	(January)		
Delivered Cost of Primary/Secondary Fuel	1.26	$/MBtu		$/MBtu
Design/Construction Period:	3.5	years		
Plant Startup Date (1st. Year Dollars):	2005	(January)		
Land Area/Unit Cost	300	acre	$1,500	/acre

FINANCIAL CRITERIA

Project Book Life:	20	years
Book Salvage Value:		%
Project Tax Life:	20	years
Tax Depreciation Method:	Accel. based on ACRS Class	
Property Tax Rate:	1.0	% per year
Insurance Tax Rate:	1.0	% per year
Federal Income Tax Rate:	34.0	%
State Income Tax Rate:	6.0	%
Investment Tax Credit/% Eligible		%
Economic Basis:	10th.Year	Constant Dollars

Capital Structure	% of Total	Cost(%)
Common Equity	20	16.5
Preferred Stock		
Debt	80	5.8
Weighted Cost of Capital:(after tax)		6.2 %

Escalation Rates	Over Book Life		1998 to 2005	
General		% per year		% per year
Primary Fuel	-1.1	% per year	-1.36	% per year
Secondary Fuel	1.2	% per year	0.041	% per year

Client: DEPARTMENT OF ENERGY
Project: Market Based Advanced Coal Power Systems
Report Date: 14-Aug-98
10:59 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2000-90/10)
Plant Size: 543.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING	7,603	1,526	6,640	465		**$16,233**	1,299		3,506	**$21,038**	39
2	COAL & SORBENT PREP & FEED	11,480	2,641	12,398	868		**$27,387**	2,191	919	4,022	**$34,519**	64
3	FEEDWATER & MISC. BOP SYSTEMS	8,097	4,016	6,386	447		**$18,946**	1,516		4,893	**$25,354**	47
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries(Destec)	15,536		15,824	1,108		**$32,468**	2,597	1,623	3,669	**$40,358**	74
4.2	High Temperature Cooling	24,846		25,317	1,772		**$51,935**	4,155	2,597	5,869	**$64,555**	119
4.3	ASU/Oxidant Compression	69,266		w/equip.			**$69,266**	5,541		7,481	**$82,288**	151
4.4-4.9	Other Gasification Equipment	12,543	4,800	11,788	825		**$29,956**	2,396	1,113	4,744	**$38,210**	70
	SUBTOTAL 4	*122,191*	*4,800*	*52,930*	*3,705*		***$183,625***	*14,690*	*5,334*	*21,762*	***$225,411***	*415*
5	HOT GAS CLEANUP & PIPING	37,832	2,554	9,016	631		**$50,033**	4,003	4,093	11,819	**$69,948**	129
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	61,888		3,868	271		**$66,026**	5,282	3,301	7,461	**$82,071**	151
6.2-6.9	Combustion Turbine Accessories		222	256	18		**$496**	40		161	**$696**	1
	SUBTOTAL 6	*61,888*	*222*	*4,124*	*289*		***$66,522***	*5,322*	*3,301*	*7,622*	***$82,767***	*152*
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	21,702		3,119	218		**$25,040**	2,003		2,704	**$29,748**	55
7.2-7.9	HRSG Accessories, Ductwork and Stack	3,281	2,209	3,165	222		**$8,877**	710		1,455	**$11,042**	20
	SUBTOTAL 7	*24,983*	*2,209*	*6,284*	*440*		***$33,917***	*2,713*		*4,159*	***$40,790***	*75*
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	19,353		3,189	223		**$22,765**	1,821		2,459	**$27,045**	50
8.2-8.9	Turbine Plant Auxiliaries and Steam Pipin	8,114	247	4,450	311		**$13,122**	1,050		2,440	**$16,612**	31
	SUBTOTAL 8	*27,467*	*247*	*7,638*	*535*		***$35,887***	*2,871*		*4,899*	***$43,657***	*80*
9	COOLING WATER SYSTEM	5,766	3,281	5,428	380		**$14,855**	1,188		2,892	**$18,935**	35
10	ASH/SPENT SORBENT HANDLING SYS	5,750	883	5,042	353		**$12,027**	962	442	1,526	**$14,958**	28
11	ACCESSORY ELECTRIC PLANT	18,990	5,447	14,090	986		**$39,514**	3,161		6,985	**$49,660**	91
12	INSTRUMENTATION & CONTROL	5,902	1,654	6,143	430		**$14,129**	1,130		2,371	**$17,630**	32
13	IMPROVEMENTS TO SITE	2,294	1,319	4,595	322		**$8,530**	682		2,764	**$11,976**	22
14	BUILDINGS & STRUCTURES		5,432	7,129	499		**$13,060**	1,045		3,526	**$17,631**	32
	TOTAL COST	**$340,244**	**$36,230**	**$147,844**	**$10,349**		**$534,667**	**$42,773**	**$14,090**	**$82,746**	**$674,276**	**1241**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98

Project: Market Based Advanced Coal Power Systems 10:59 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2000-90/10)

Plant Size: 543.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
1.1	Coal Receive & Unload	1,997		1,099	77		$3,172	254		685	$4,111	8
1.2	Coal Stackout & Reclaim	2,580		704	49		$3,334	267		720	$4,320	8
1.3	Coal Conveyors & Yd Crush	2,399		697	49		$3,144	252		679	$4,075	8
1.4	Other Coal Handling	628		161	11		$800	64		173	$1,037	2
1.5	Sorbent Receive & Unload											
1.6	Sorbent Stackout & Reclaim											
1.7	Sorbent Conveyors											
1.8	Other Sorbent Handling											
1.9	Coal & Sorbent Hnd.Foundations		1,526	3,978	278		$5,783	463		1,249	$7,495	14
	SUBTOTAL 1.	**$7,603**	**$1,526**	**$6,640**	**$465**		**$16,233**	**$1,299**		**$3,506**	**$21,038**	**39**
2	COAL & SORBENT PREP & FEED											
2.1	Coal Crushing & Drying	1,592	248	597	42		$2,479	198		535	$3,212	6
2.2	Prepared Coal Storage & Feed	548	123	97	7		$774	62		167	$1,003	2
2.3	Slurry Prep & Feed	8,876		8,891	622		$18,389	1,471	919	2,078	$22,857	42
2.4	Misc.Coal Prep & Feed	465	317	1,143	80		$2,005	160		433	$2,598	5
2.5	Sorbent Prep Equipment											
2.6	Sorbent Storage & Feed											
2.7	Sorbent Injection System											
2.8	Booster Air Supply System											
2.9	Coal & Sorbent Feed Foundation		1,953	1,671	117		$3,741	299		808	$4,849	9
	SUBTOTAL 2.	**$11,480**	**$2,641**	**$12,398**	**$868**		**$27,387**	**$2,191**	**$919**	**$4,022**	**$34,519**	**64**
3	FEEDWATER & MISC. BOP SYSTEMS											
3.1	FeedwaterSystem	1,163	2,262	1,207	85		$4,718	377		1,019	$6,114	11
3.2	Water Makeup & Pretreating	588	62	338	24		$1,012	81		328	$1,421	3
3.3	Other Feedwater Subsystems	692	259	235	16		$1,203	96		260	$1,559	3
3.4	Service Water Systems	45	97	341	24		$507	41		164	$712	1
3.5	Other Boiler Plant Systems	1,923	776	1,945	136		$4,781	383		1,033	$6,197	11
3.6	FO Supply Sys & Nat Gas	125	236	444	31		$836	67		181	$1,083	2
3.7	Waste Treatment Equipment	1,169		685	48		$1,902	152		616	$2,671	5
3.8	Misc. Power Plant Equipment	2,390	323	1,191	83		$3,987	319		1,292	$5,598	10
	SUBTOTAL 3.	**$8,097**	**$4,016**	**$6,386**	**$447**		**$18,946**	**$1,516**		**$4,893**	**$25,354**	**47**
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries(Destec)	15,536		15,824	1,108		$32,468	2,597	1,623	3,669	$40,358	74
4.2	High Temperature Cooling	24,846		25,317	1,772		$51,935	4,155	2,597	5,869	$64,555	119
4.3	ASU/Oxidant Compression	69,266		w/equip.			$69,266	5,541		7,481	$82,288	151
4.4	LT Heat Recovery & FG Saturation	12,543		9,088	636		$22,267	1,781	1,113	2,516	$27,678	51
4.5	Misc. Gasification Equipment	w/4.1&4.2		w/4.1&4.2								
4.6	Other Gasification Equipment		846	348	24		$1,219	98		132	$1,448	3
4.8	Major Component Rigging	w/4.1&4.2		w/4.1&4.2								
4.9	Gasification Foundations		3,953	2,352	165		$6,470	518		2,096	$9,083	17
	SUBTOTAL 4.	**$122,191**	**$4,800**	**$52,930**	**$3,705**		**$183,625**	**$14,690**	**$5,334**	**$21,762**	**$225,411**	**415**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 10:59 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2000-90/10)
Plant Size: 543.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
5	HOT GAS CLEANUP & PIPING											
5.1	MDEA-LT AGR	9,942					$9,942	795	497	2,247	$13,481	25
5.2	Sulfur Recovery (Sulfuric Acid)	18,151		5,744	402		$24,297	1,944	1,215	5,491	$32,947	61
5.3	Chloride Guard	4,376		1,039	73		$5,487	439	1,372	1,460	$8,757	16
5.4	Particulate Removal	3,799		485	34		$4,318	345	648	1,062	$6,373	12
5.5	Blowback Gas Systems	1,565	527	300	21		$2,412	193	362	593	$3,561	7
5.6	Fuel Gas Piping		987	750	52		$1,789	143		387	$2,319	4
5.9	HGCU Foundations		1,040	699	49		$1,788	143		579	$2,510	5
	SUBTOTAL 5.	**$37,832**	**$2,554**	**$9,016**	**$631**		**$50,033**	**$4,003**	**$4,093**	**$11,819**	**$69,948**	**129**
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	61,888		3,868	271		$66,026	5,282	3,301	7,461	$82,071	151
6.2	Combustion Turbine Accessories	w/6.1		w/6.1								
6.3	Compressed Air Piping											
6.9	Combustion Turbine Foundations		222	256	18		$496	40		161	$696	1
	SUBTOTAL 6.	**$61,888**	**$222**	**$4,124**	**$289**		**$66,522**	**$5,322**	**$3,301**	**$7,622**	**$82,767**	**152**
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	21,702		3,119	218		$25,040	2,003		2,704	$29,748	55
7.2	HRSG Accessories											
7.3	Ductwork		2,048	1,758	123		$3,928	314		849	$5,091	9
7.4	Stack	3,281		1,246	87		$4,615	369		498	$5,482	10
7.9	HRSG,Duct & Stack Foundations		161	161	11		$334	27		108	$469	1
	SUBTOTAL 7.	**$24,983**	**$2,209**	**$6,284**	**$440**		**$33,917**	**$2,713**		**$4,159**	**$40,790**	**75**
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	19,353		3,189	223		$22,765	1,821		2,459	$27,045	50
8.2	Turbine Plant Auxiliaries	128		297	21		$446	36		48	$529	1
8.3	Condenser & Auxiliaries	3,300		913	64		$4,277	342		462	$5,081	9
8.4	Steam Piping	4,685		2,468	173		$7,326	586		1,583	$9,495	17
8.9	TG Foundations		247	772	54		$1,073	86		348	$1,506	3
	SUBTOTAL 8.	**$27,467**	**$247**	**$7,638**	**$535**		**$35,887**	**$2,871**		**$4,899**	**$43,657**	**80**
9	COOLING WATER SYSTEM											
9.1	Cooling Towers	4,315		957	67		$5,339	427		577	$6,343	12
9.2	Circulating Water Pumps	631		60	4		$696	56		75	$826	2
9.3	Circ.Water System Auxiliaries	77		11	1		$89	7		10	$106	0
9.4	Circ.Water Piping		1,496	1,682	118		$3,296	264		712	$4,271	8
9.5	Make-up Water System	172		257	18		$447	36		97	$579	1
9.6	Component Cooling Water Sys	571	683	507	36		$1,798	144		388	$2,330	4
9.9	Circ.Water System Foundations		1,102	1,953	137		$3,191	255		1,034	$4,480	8
	SUBTOTAL 9.	**$5,766**	**$3,281**	**$5,428**	**$380**		**$14,855**	**$1,188**		**$2,892**	**$18,935**	**35**
10	ASH/SPENT SORBENT HANDLING SYS											
10.1	Slag Dewatering & Cooling	4,279		4,266	299		$8,843	707	442	999	$10,992	20
10.2	Gasifier Ash Depressurization											
10.3	Cleanup Ash Depressurization											
10.4	High Temperature Ash Piping											
10.5	Other Ash Recovery Equipment											
10.6	Ash Storage Silos	336		370	26		$732	59		119	$910	2
10.7	Ash Transport & Feed Equipment	438		110	8		$556	44		90	$691	1
10.8	Misc. Ash Handling Equipment	697	854	258	18		$1,827	146		296	$2,269	4
10.9	Ash/Spent Sorbent Foundation		29	38	3		$69	6		22	$97	0
	SUBTOTAL 10.	**$5,750**	**$883**	**$5,042**	**$353**		**$12,027**	**$962**	**$442**	**$1,526**	**$14,958**	**28**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 10:59 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2000-90/10)
Plant Size: 543.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
11	ACCESSORY ELECTRIC PLANT											
11.1	Generator Equipment	2,671		530	37		$3,239	259		350	$3,848	7
11.2	Station Service Equipment	4,944		408	29		$5,381	430		581	$6,392	12
11.3	Switchgear & Motor Control	3,942		656	46		$4,643	371		752	$5,767	11
11.4	Conduit & Cable Tray		2,377	7,458	522		$10,357	829		2,237	$13,422	25
11.5	Wire & Cable		2,552	2,548	178		$5,278	422		1,140	$6,840	13
11.6	Protective Equipment		198	659	46		$903	72		146	$1,122	2
11.7	Standby Equipment	801		18	1		$820	66		133	$1,019	2
11.8	Main Power Transformers	6,631		930	65		$7,626	610		1,235	$9,472	17
11.9	Electrical Foundations		320	884	62		$1,267	101		410	$1,778	3
	SUBTOTAL 11.	**$18,990**	**$5,447**	**$14,090**	**$986**		**$39,514**	**$3,161**		**$6,985**	**$49,660**	**91**
12	INSTRUMENTATION & CONTROL											
12.1	IGCC Control Equipment											
12.2	Combustion Turbine Control											
12.3	Steam Turbine Control											
12.4	Other Major Component Control	554		338	24		$916	73		148	$1,138	2
12.5	Signal Processing Equipment	W/12.7		w/12.7								
12.6	Control Boards,Panels & Racks	133		78	5		$216	17		47	$280	1
12.7	Computer & Accessories	4,239		155	11		$4,405	352		476	$5,233	10
12.8	Instrument Wiring & Tubing		1,654	5,139	360		$7,152	572		1,545	$9,269	17
12.9	Other I & C Equipment	975		433	30		$1,439	115		155	$1,710	3
	SUBTOTAL 12.	**$5,902**	**$1,654**	**$6,143**	**$430**		**$14,129**	**$1,130**		**$2,371**	**$17,630**	**32**
13	IMPROVEMENTS TO SITE											
13.1	Site Preparation		39	766	54		$859	69		278	$1,206	2
13.2	Site Improvements		1,280	1,580	111		$2,971	238		963	$4,171	8
13.3	Site Facilities	2,294		2,248	157		$4,700	376		1,523	$6,599	12
	SUBTOTAL 13.	**$2,294**	**$1,319**	**$4,595**	**$322**		**$8,530**	**$682**		**$2,764**	**$11,976**	**22**
14	BUILDINGS & STRUCTURES											
14.1	Combustion Turbine Area		269	169	12		$450	36		122	$608	1
14.2	Steam Turbine Building		2,508	3,978	278		$6,765	541		1,827	$9,133	17
14.3	Administration Building		493	398	28		$919	74		248	$1,241	2
14.4	Circulation Water Pumphouse		97	57	4		$158	13		43	$214	0
14.5	Water Treatment Buildings		615	668	47		$1,330	106		359	$1,795	3
14.6	Machine Shop		252	192	13		$458	37		124	$619	1
14.7	Warehouse		407	293	21		$721	58		195	$973	2
14.8	Other Buildings & Structures		244	212	15		$470	38		127	$635	1
14.9	Waste Treating Building & Str.		546	1,161	81		$1,788	143		483	$2,414	4
	SUBTOTAL 14.		**$5,432**	**$7,129**	**$499**		**$13,060**	**$1,045**		**$3,526**	**$17,631**	**32**
	TOTAL COST	**$340,244**	**$36,230**	**$147,844**	**$10,349**		**$534,667**	**$42,773**	**$14,090**	**$82,746**	**$674,276**	**1241**

CONTINGENCY FACTORS

Destec (2000-90/10)

Item/Description	Contingency Factors(%) %Process	%Project
COAL & SORBENT HANDLING		20.0
COAL & SORBENT PREP & FEED	3.4	13.2
FEEDWATER & MISC. BOP SYSTEMS		23.9
GASIFIER & ACCESSORIES		
Gasifier & Auxiliaries(Destec)	5.0	10.0
High Temperature Cooling	5.0	10.0
ASU/Oxidant Compression		10.0
Other Gasification Equipment	3.7	14.2
HOT GAS CLEANUP & PIPING	8.2	20.3
COMBUSTION TURBINE/ACCESSORIES		
Combustion Turbine Generator	5.0	10.0
Combustion Turbine Accessories		30.0
HRSG, DUCTING & STACK		
Heat Recovery Steam Generator		10.0
HRSG Accessories, Ductwork and Stack		15.2
STEAM TURBINE GENERATOR		
Steam TG & Accessories		10.0
Turbine Plant Auxiliaries and Steam Piping		17.2
COOLING WATER SYSTEM		18.0
ASH/SPENT SORBENT HANDLING SYS	3.7	11.4
ACCESSORY ELECTRIC PLANT		16.4
INSTRUMENTATION & CONTROL		15.5
IMPROVEMENTS TO SITE		30.0
BUILDINGS & STRUCTURES		25.0

OPERATING LABOR REQUIREMENTS			
Destec (2000-90/10)			
Operating Labor Rate(base):	25.89	$/hour	
Operating Labor Burden:	30.00	% of base	
Labor O-H Charge Rate:	25.00	% of labor	
Operating Labor Requirements(O.J.)per Shift:			
Category	1 unit/mod.		Total Plant
Skilled Operator	2.0		2.0
Operator	12.0		12.0
Foreman	1.0		1.0
Lab Tech's, etc.	3.0		3.0
TOTAL-O.J.'s	18.0		18.0

CONSUMABLES, BY-PRODUCTS & FUELS DATA			
Destec (2000-90/10)			
Item/Description	Consumption Initial	/Day	Unit Cost
Water(/1000 gallons)		4,785	0.80
Chemicals			
MU & WT Chem.(lbs)	427,634	14,254	0.16
Limestone (ton)			16.25
Amine Makeup (lb)**	511	17.0	1.30
Nahcolite(ton)	132	4.4	270.00
Other			
Supplemental Fuel(MBtu)			
Gases,N2 etc.(/100scf)			1.50
L.P. Steam(/1000 pounds)			
Waste Disposal			
Sludge(ton)			
Slag(ton)		477	10.00
By-products & Emissions			
Sulfuric Acid(tons)		360	68.00
Fuel(ton)		4,762	29.29

MAINTENANCE FACTORS
Destec (2000-90/10)

Item/Description	Maintenance %
COAL & SORBENT HANDLING	2.0
COAL & SORBENT PREP & FEED	2.9
FEEDWATER & MISC. BOP SYSTEMS	2.0
GASIFIER & ACCESSORIES	
Gasifier & Auxiliaries(Destec)	5.0
High Temperature Cooling	4.5
ASU/Oxidant Compression	4.0
Other Gasification Equipment	3.5
HOT GAS CLEANUP & PIPING	4.3
COMBUSTION TURBINE/ACCESSORIES	
Combustion Turbine Generator	9.0
Combustion Turbine Accessories	0.5
HRSG, DUCTING & STACK	
Heat Recovery Steam Generator	2.0
HRSG Accessories, Ductwork and Stack	1.5
STEAM TURBINE GENERATOR	
Steam TG & Accessories	1.5
Turbine Plant Auxiliaries and Steam Piping	1.7
COOLING WATER SYSTEM	1.3
ASH/SPENT SORBENT HANDLING SYS	3.0
ACCESSORY ELECTRIC PLANT	1.5
INSTRUMENTATION & CONTROL	1.6
IMPROVEMENTS TO SITE	1.2
BUILDINGS & STRUCTURES	1.4

Intermediate Oxygen-Blown IGCC

CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY

TITLE/DEFINITION

Case:	Destec (2005-80/20)		
Plant Size:	349.2 (MW,net)	HeatRate:	7,513 (Btu/kWh)
Primary/Secondary Fuel(type):	Illnois #6	Cost:	1.26 ($/MMBtu)
Design/Construction:	2.5 (years)	BookLife:	20 (years)
TPC(Plant Cost) Year:	1998 (Jan.)	TPI Year:	2005 (Jan.)
Capacity Factor:	85 (%)		

CAPITAL INVESTMENT		**$x1000**	**$/kW**
Process Capital & Facilities		334,677	958.4
Engineering(incl.C.M.,H.O.& Fee)		26,774	76.7
Process Contingency		13,564	38.8
Project Contingency		54,240	155.3
TOTAL PLANT COST(TPC)		$429,256	1229.2
TOTAL CASH EXPENDED	$429,256		
AFDC	$26,438		
TOTAL PLANT INVESTMENT(TPI)		$455,694	1304.9
Royalty Allowance			
Preproduction Costs		11,156	31.9
Inventory Capital		3,371	9.7
Initial Catalyst & Chemicals(w/equip.)			
Land Cost		450	1.3
TOTAL CAPITAL REQUIREMENT(TCR)		$470,670	1347.8

OPERATING & MAINTENANCE COSTS (1998 Dollars)	**$x1000**	**$/kW-yr**
Operating Labor	4,717	13.5
Maintenance Labor	3,174	9.1
Maintenance Material	4,761	13.6
Administrative & Support Labor	1,973	5.6
TOTAL OPERATION & MAINTENANCE	$14,625	41.9
FIXED O & M		35.60 $/kW-yr
VARIABLE O & M		0.08 ¢/kWh

CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars)	**$x1000**	**¢/kWh**
Water	632	0.02
Chemicals	1,358	0.05
Other Consumables		
Waste Disposal	834	0.03
TOTAL CONSUMABLE OPERATING COSTS	$2,825	0.11
BY-PRODUCT CREDITS (1998 Dollars)	($4,352)	-0.17
FUEL COST (1998 Dollars)	$24,520	0.94

	1st Year (2005 $)		**Levelized (10th.Year $)**	
PRODUCTION COST SUMMARY		**¢/kWh**		**¢/kWh**
Fixed O & M	35.6/kW-yr	0.48	35.6/kW-yr	0.48
Variable O & M		0.08		0.08
Consumables		0.11		0.11
By-product Credit		-0.17		-0.17
Fuel		0.86		0.81
TOTAL PRODUCTION COST		1.36		1.32
LEVELIZED CARRYING CHARGES(Capital)			182.0/kW-yr	2.44
LEVELIZED (10th.Year) BUSBAR COST OF POWER				3.76

ESTIMATE BASIS/FINANCIAL CRITERIA for REVENUE REQUIREMENT CALCULATIONS

GENERAL DATA/CHARACTERISTICS

Case Title:	Destec (2005-80/20)			
Unit Size:/Plant Size:	349.2	MW,net	349.2	MWe
Location:	Middletown, USA			
Fuel: Primary/Secondary	Illnois #6			
Energy From Primary/Secondary Fuels	7,513	Btu/kWh		Btu/kWh
Levelized Capacity Factor / Preproduction(equivalent months):	85	%	1	months
Capital Cost Year Dollars (Reference Year Dollars):	1998	(January)		
Delivered Cost of Primary/Secondary Fuel	1.26	$/MBtu		$/MBtu
Design/Construction Period:	2.5	years		
Plant Startup Date (1st. Year Dollars):	2005	(January)		
Land Area/Unit Cost	300	acre	$1,500	/acre

FINANCIAL CRITERIA

Project Book Life:	20	years		
Book Salvage Value:		%		
Project Tax Life:	20	years		
Tax Depreciation Method:	Accel. based on ACRS Class			
Property Tax Rate:	1.0	% per year		
Insurance Tax Rate:	1.0	% per year		
Federal Income Tax Rate:	34.0	%		
State Income Tax Rate:	6.0	%		
Investment Tax Credit/% Eligible		%		%
Economic Basis:	10th.Year	Constant Dollars		

Capital Structure	% of Total	Cost(%)
Common Equity	20	16.5
Preferred Stock		
Debt	80	5.8
Weighted Cost of Capital:(after tax)		6.2 %

Escalation Rates	Over Book Life		1998 to 2005	
General		% per year		% per year
Primary Fuel	-1.1	% per year	-1.36	% per year
Secondary Fuel	1.2	% per year	0.041	% per year

Client: DEPARTMENT OF ENERGY
Project: Market Based Advanced Coal Power Systems
Report Date: 14-Aug-98
11:00 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2005-80/20)
Plant Size: 349.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING	5,347	1,073	4,670	327		**$11,417**	913		2,466	**$14,796**	42
2	COAL & SORBENT PREP & FEED	6,455	1,485	6,972	488		**$15,400**	1,232	517	2,261	**$19,410**	56
3	FEEDWATER & MISC. BOP SYSTEMS	5,483	2,655	4,284	300		**$12,722**	1,018		3,309	**$17,049**	49
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries(Destec)	8,575		8,734	611		**$17,921**	1,434	1,792	2,115	**$23,261**	67
4.2	High Temperature Cooling	14,603		14,880	1,042		**$30,525**	2,442	3,052	3,602	**$39,621**	113
4.3	ASU/Oxidant Compression	45,518		w/equip.			**$45,518**	3,641		4,916	**$54,075**	155
4.4-4.9	Other Gasification Equipment		3,760	2,093	147		**$5,999**	480		1,700	**$8,179**	23
	SUBTOTAL 4	*68,696*	*3,760*	*25,707*	*1,800*		***$99,963***	*7,997*	*4,845*	*12,333*	***$125,137***	*358*
5	HOT GAS CLEANUP & PIPING	24,722	2,048	8,700	609		**$36,079**	2,886	4,305	8,814	**$52,084**	149
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	42,367		2,820	197		**$45,384**	3,631	3,404	5,242	**$57,660**	165
6.2-6.9	Combustion Turbine Accessories		136	157	11		**$305**	24		99	**$428**	1
	SUBTOTAL 6	*42,367*	*136*	*2,977*	*208*		***$45,689***	*3,655*	*3,404*	*5,341*	***$58,088***	*166*
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	13,056		1,877	131		**$15,065**	1,205		1,627	**$17,897**	51
7.2-7.9	HRSG Accessories, Ductwork and Stack	1,898	706	1,341	94		**$4,039**	323		605	**$4,967**	14
	SUBTOTAL 7	*14,955*	*706*	*3,217*	*225*		***$19,103***	*1,528*		*2,232*	***$22,864***	*65*
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	12,044		1,984	139		**$14,168**	1,133		1,530	**$16,831**	48
8.2-8.9	Turbine Plant Auxiliaries and Steam Pipin	5,263	160	2,887	202		**$8,513**	681		1,583	**$10,777**	31
	SUBTOTAL 8	*17,308*	*160*	*4,871*	*341*		***$22,680***	*1,814*		*3,113*	***$27,608***	*79*
9	COOLING WATER SYSTEM	3,714	2,055	3,501	245		**$9,514**	761		1,846	**$12,121**	35
10	ASH/SPENT SORBENT HANDLING SYS	3,463	642	2,949	206		**$7,261**	581	494	967	**$9,303**	27
11	ACCESSORY ELECTRIC PLANT	11,636	3,829	9,563	669		**$25,696**	2,056		4,571	**$32,323**	93
12	INSTRUMENTATION & CONTROL	5,117	1,434	5,327	373		**$12,251**	980		2,056	**$15,287**	44
13	IMPROVEMENTS TO SITE	1,831	1,053	3,667	257		**$6,807**	545		2,205	**$9,557**	27
14	BUILDINGS & STRUCTURES		4,241	5,471	383		**$10,096**	808		2,726	**$13,629**	39
	TOTAL COST	**$211,093**	**$25,277**	**$91,876**	**$6,431**		**$334,677**	**$26,774**	**$13,564**	**$54,240**	**$429,256**	**1229**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98

Project: Market Based Advanced Coal Power Systems 11:00 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2005-80/20)

Plant Size: 349.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
1.1	Coal Receive & Unload	1,404		773	54		$2,231	178		482	$2,891	8
1.2	Coal Stackout & Reclaim	1,814		495	35		$2,345	188		506	$3,038	9
1.3	Coal Conveyors & Yd Crush	1,687		490	34		$2,211	177		478	$2,866	8
1.4	Other Coal Handling	441		113	8		$563	45		122	$729	2
1.5	Sorbent Receive & Unload											
1.6	Sorbent Stackout & Reclaim											
1.7	Sorbent Conveyors											
1.8	Other Sorbent Handling											
1.9	Coal & Sorbent Hnd.Foundations		1,073	2,798	196		$4,067	325		878	$5,271	15
	SUBTOTAL 1.	**$5,347**	**$1,073**	**$4,670**	**$327**		**$11,417**	**$913**		**$2,466**	**$14,796**	**42**
2	COAL & SORBENT PREP & FEED											
2.1	Coal Crushing & Drying	895	140	336	23		$1,394	112		301	$1,806	5
2.2	Prepared Coal Storage & Feed	308	69	54	4		$435	35		94	$564	2
2.3	Slurry Prep & Feed	4,991		4,999	350		$10,340	827	517	1,168	$12,853	37
2.4	Misc.Coal Prep & Feed	262	178	643	45		$1,127	90		243	$1,461	4
2.5	Sorbent Prep Equipment											
2.6	Sorbent Storage & Feed											
2.7	Sorbent Injection System											
2.8	Booster Air Supply System											
2.9	Coal & Sorbent Feed Foundation		1,098	940	66		$2,104	168		454	$2,726	8
	SUBTOTAL 2.	**$6,455**	**$1,485**	**$6,972**	**$488**		**$15,400**	**$1,232**	**$517**	**$2,261**	**$19,410**	**56**
3	FEEDWATER & MISC. BOP SYSTEMS											
3.1	FeedwaterSystem	754	1,467	783	55		$3,058	245		661	$3,964	11
3.2	Water Makeup & Pretreating	376	40	216	15		$646	52		209	$907	3
3.3	Other Feedwater Subsystems	449	168	153	11		$780	62		168	$1,011	3
3.4	Service Water Systems	29	62	218	15		$324	26		105	$455	1
3.5	Other Boiler Plant Systems	1,229	496	1,243	87		$3,054	244		660	$3,958	11
3.6	FO Supply Sys & Nat Gas	94	178	336	23		$632	51		136	$818	2
3.7	Waste Treatment Equipment	747		438	31		$1,215	97		394	$1,706	5
3.8	Misc. Power Plant Equipment	1,806	244	900	63		$3,013	241		976	$4,230	12
	SUBTOTAL 3.	**$5,483**	**$2,655**	**$4,284**	**$300**		**$12,722**	**$1,018**		**$3,309**	**$17,049**	**49**
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries(Destec)	8,575		8,734	611		$17,921	1,434	1,792	2,115	$23,261	67
4.2	High Temperature Cooling	14,603		14,880	1,042		$30,525	2,442	3,052	3,602	$39,621	113
4.3	ASU/Oxidant Compression	45,518		w/equip.			$45,518	3,641		4,916	$54,075	155
4.4	Booster Air Compression											
4.5	Misc. Gasification Equipment	w/4.1&4.2		w/4.1&4.2								
4.6	Other Gasification Equipment		784	322	23		$1,129	90		122	$1,341	4
4.8	Major Component Rigging	w/4.1&4.2		w/4.1&4.2								
4.9	Gasification Foundations		2,976	1,771	124		$4,871	390		1,578	$6,839	20
	SUBTOTAL 4.	**$68,696**	**$3,760**	**$25,707**	**$1,800**		**$99,963**	**$7,997**	**$4,845**	**$12,333**	**$125,137**	**358**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 11:00 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2005-80/20)
Plant Size: 349.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
5	HOT GAS CLEANUP & PIPING											
5.1	Transport Reactor	3,895		2,095	147		$6,136	491	920	1,509	$9,057	26
5.2	Sulfur Recovery (Sulfuric Acid)	12,541		3,969	278		$16,787	1,343	839	3,794	$22,764	65
5.3	Chloride Guard	2,995		711	50		$3,756	300	939	999	$5,995	17
5.4	Particulate Removal	4,177		515	36		$4,728	378	1,182	1,258	$7,546	22
5.5	Blowback Gas Systems	1,113	362	206	14		$1,696	136	424	451	$2,706	8
5.6	Fuel Gas Piping		821	624	44		$1,488	119		321	$1,929	6
5.9	HGCU Foundations		865	581	41		$1,487	119		482	$2,088	6
	SUBTOTAL 5.	**$24,722**	**$2,048**	**$8,700**	**$609**		**$36,079**	**$2,886**	**$4,305**	**$8,814**	**$52,084**	**149**
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	42,367		2,820	197		$45,384	3,631	3,404	5,242	$57,660	165
6.2	Combustion Turbine Accessories	w/6.1		w/6.1								
6.3	Compressed Air Piping											
6.9	Combustion Turbine Foundations		136	157	11		$305	24		99	$428	1
	SUBTOTAL 6.	**$42,367**	**$136**	**$2,977**	**$208**		**$45,689**	**$3,655**	**$3,404**	**$5,341**	**$58,088**	**166**
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	13,056		1,877	131		$15,065	1,205		1,627	$17,897	51
7.2	HRSG Accessories											
7.3	Ductwork		613	526	37		$1,176	94		254	$1,525	4
7.4	Stack	1,898		721	50		$2,669	214		288	$3,171	9
7.9	HRSG,Duct & Stack Foundations		93	93	7		$193	15		63	$271	1
	SUBTOTAL 7.	**$14,955**	**$706**	**$3,217**	**$225**		**$19,103**	**$1,528**		**$2,232**	**$22,864**	**65**
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	12,044		1,984	139		$14,168	1,133		1,530	$16,831	48
8.2	Turbine Plant Auxiliaries	83		193	13		$289	23		31	$343	1
8.3	Condenser & Auxiliaries	2,141		592	41		$2,775	222		300	$3,296	9
8.4	Steam Piping	3,039		1,601	112		$4,753	380		1,027	$6,160	18
8.9	TG Foundations		160	501	35		$696	56		225	$977	3
	SUBTOTAL 8.	**$17,308**	**$160**	**$4,871**	**$341**		**$22,680**	**$1,814**		**$3,113**	**$27,608**	**79**
9	COOLING WATER SYSTEM											
9.1	Cooling Towers	2,849		632	44		$3,526	282		381	$4,189	12
9.2	Circulating Water Pumps	417		40	3		$459	37		50	$546	2
9.3	Circ.Water System Auxiliaries	51		7	1		$59	5		6	$70	0
9.4	Circ.Water Piping		988	1,110	78		$2,176	174		470	$2,820	8
9.5	Make-up Water System	113		170	12		$295	24		64	$382	1
9.6	Component Cooling Water Sys	283	339	252	18		$892	71		193	$1,156	3
9.9	Circ.Water System Foundations		727	1,289	90		$2,107	169		683	$2,958	8
	SUBTOTAL 9.	**$3,714**	**$2,055**	**$3,501**	**$245**		**$9,514**	**$761**		**$1,846**	**$12,121**	**35**
10	ASH/SPENT SORBENT HANDLING SYS											
10.1	Slag Dewatering & Cooling	2,392		2,385	167		$4,944	395	494	583	$6,417	18
10.2	Gasifier Ash Depressurization											
10.3	Cleanup Ash Depressurization											
10.4	High Temperature Ash Piping											
10.5	Other Ash Recovery Equipment											
10.6	Ash Storage Silos	245		269	19		$533	43		86	$662	2
10.7	Ash Transport & Feed Equipment	319		80	6		$405	32		66	$503	1
10.8	Misc. Ash Handling Equipment	507	621	188	13		$1,329	106		215	$1,651	5
10.9	Ash/Spent Sorbent Foundation		21	27	2		$50	4		16	$71	0
	SUBTOTAL 10.	**$3,463**	**$642**	**$2,949**	**$206**		**$7,261**	**$581**	**$494**	**$967**	**$9,303**	**27**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 11:00 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2005-80/20)
Plant Size: 349.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
11	ACCESSORY ELECTRIC PLANT											
11.1	Generator Equipment	1,376		273	19		$1,669	134		180	$1,983	6
11.2	Station Service Equipment	3,552		293	21		$3,866	309		418	$4,593	13
11.3	Switchgear & Motor Control	2,832		471	33		$3,336	267		540	$4,144	12
11.4	Conduit & Cable Tray		1,708	5,358	375		$7,441	595		1,607	$9,644	28
11.5	Wire & Cable		1,833	1,831	128		$3,792	303		819	$4,915	14
11.6	Protective Equipment		131	437	31		$599	48		97	$744	2
11.7	Standby Equipment	639		14	1		$655	52		106	$813	2
11.8	Main Power Transformers	3,235		454	32		$3,720	298		603	$4,621	13
11.9	Electrical Foundations		156	431	30		$618	49		200	$868	2
	SUBTOTAL 11.	**$11,636**	**$3,829**	**$9,563**	**$669**		**$25,696**	**$2,056**		**$4,571**	**$32,323**	**93**
12	INSTRUMENTATION & CONTROL											
12.1	IGCC Control Equipment											
12.2	Combustion Turbine Control											
12.3	Steam Turbine Control											
12.4	Other Major Component Control	480		293	21		$794	64		129	$987	3
12.5	Signal Processing Equipment	W/12.7		w/12.7								
12.6	Control Boards,Panels & Racks	115		68	5		$188	15		41	$243	1
12.7	Computer & Accessories	3,676		135	9		$3,820	306		413	$4,538	13
12.8	Instrument Wiring & Tubing		1,434	4,456	312		$6,202	496		1,340	$8,037	23
12.9	Other I & C Equipment	846		376	26		$1,248	100		135	$1,482	4
	SUBTOTAL 12.	**$5,117**	**$1,434**	**$5,327**	**$373**		**$12,251**	**$980**		**$2,056**	**$15,287**	**44**
13	IMPROVEMENTS TO SITE											
13.1	Site Preparation		31	612	43		$685	55		222	$962	3
13.2	Site Improvements		1,022	1,261	88		$2,371	190		768	$3,329	10
13.3	Site Facilities	1,831		1,794	126		$3,751	300		1,215	$5,266	15
	SUBTOTAL 13.	**$1,831**	**$1,053**	**$3,667**	**$257**		**$6,807**	**$545**		**$2,205**	**$9,557**	**27**
14	BUILDINGS & STRUCTURES											
14.1	Combustion Turbine Area		214	135	9		$359	29		97	$485	1
14.2	Steam Turbine Building		1,757	2,788	195		$4,740	379		1,280	$6,399	18
14.3	Administration Building		422	341	24		$786	63		212	$1,061	3
14.4	Circulation Water Pumphouse		83	49	3		$135	11		37	$183	1
14.5	Water Treatment Buildings		526	571	40		$1,137	91		307	$1,535	4
14.6	Machine Shop		216	164	12		$392	31		106	$529	2
14.7	Warehouse		348	250	18		$616	49		166	$832	2
14.8	Other Buildings & Structures		209	181	13		$402	32		109	$543	2
14.9	Waste Treating Building & Str.		466	993	69		$1,528	122		413	$2,063	6
	SUBTOTAL 14.		**$4,241**	**$5,471**	**$383**		**$10,096**	**$808**		**$2,726**	**$13,629**	**39**
	TOTAL COST	**$211,093**	**$25,277**	**$91,876**	**$6,431**		**$334,677**	**$26,774**	**$13,564**	**$54,240**	**$429,256**	**1229**

CONTINGENCY FACTORS

Destec (2005-80/20)

Item/Description	Contingency Factors(%) %Process	%Project
COAL & SORBENT HANDLING		20.0
COAL & SORBENT PREP & FEED	3.4	13.2
FEEDWATER & MISC. BOP SYSTEMS		24.1
GASIFIER & ACCESSORIES		
Gasifier & Auxiliaries(Destec)	10.0	10.0
High Temperature Cooling	10.0	10.0
ASU/Oxidant Compression		10.0
Other Gasification Equipment		26.2
HOT GAS CLEANUP & PIPING	11.9	20.4
COMBUSTION TURBINE/ACCESSORIES		
Combustion Turbine Generator	7.5	10.0
Combustion Turbine Accessories		30.0
HRSG, DUCTING & STACK		
Heat Recovery Steam Generator		10.0
HRSG Accessories, Ductwork and Stack		13.9
STEAM TURBINE GENERATOR		
Steam TG & Accessories		10.0
Turbine Plant Auxiliaries and Steam Piping		17.2
COOLING WATER SYSTEM		18.0
ASH/SPENT SORBENT HANDLING SYS	6.8	11.6
ACCESSORY ELECTRIC PLANT		16.5
INSTRUMENTATION & CONTROL		15.5
IMPROVEMENTS TO SITE		30.0
BUILDINGS & STRUCTURES		25.0

OPERATING LABOR REQUIREMENTS			
Destec (2005-80/20)			
Operating Labor Rate(base):	25.89	$/hour	
Operating Labor Burden:	30.00	% of base	
Labor O-H Charge Rate:	25.00	% of labor	
Operating Labor Requirements(O.J.)per Shift:			
Category	1 unit/mod.		Total Plant
Skilled Operator	2.0		2.0
Operator	10.0		10.0
Foreman	1.0		1.0
Lab Tech's, etc.	3.0		3.0
TOTAL-O.J.'s	16.0		16.0

CONSUMABLES, BY-PRODUCTS & FUELS DATA			
Destec (2005-80/20)			
Item/Description	Consumption Initial	/Day	Unit Cost
Water(/1000 gallons)		2,545	0.80
Chemicals			
MU & WT Chem.(lbs)	227,461	7,582	0.16
Limestone (ton)			16.25
Z Sorb (ton)**	21,600	720.0	3.50
Nahcolite(ton)	75	2.5	270.00
Other			
Supplemental Fuel(MBtu)			
Gases,N2 etc.(/100scf)			1.50
L.P. Steam(/1000 pounds)			
Waste Disposal			
Sludge(ton)			
Slag(ton)		269	10.00
By-products & Emissions			
Sulfuric Acid(pounds)		206	68.00
Fuel(ton)		2,699	29.29

MAINTENANCE FACTORS
Destec (2005-80/20)

Item/Description	Maintenance %
COAL & SORBENT HANDLING	2.0
COAL & SORBENT PREP & FEED	2.9
FEEDWATER & MISC. BOP SYSTEMS	2.0
GASIFIER & ACCESSORIES	
Gasifier & Auxiliaries(Destec)	5.0
High Temperature Cooling	4.5
ASU/Oxidant Compression	4.0
Other Gasification Equipment	0.8
HOT GAS CLEANUP & PIPING	4.5
COMBUSTION TURBINE/ACCESSORIES	
Combustion Turbine Generator	10.3
Combustion Turbine Accessories	0.5
HRSG, DUCTING & STACK	
Heat Recovery Steam Generator	2.0
HRSG Accessories, Ductwork and Stack	1.5
STEAM TURBINE GENERATOR	
Steam TG & Accessories	1.5
Turbine Plant Auxiliaries and Steam Piping	1.7
COOLING WATER SYSTEM	1.3
ASH/SPENT SORBENT HANDLING SYS	3.0
ACCESSORY ELECTRIC PLANT	1.5
INSTRUMENTATION & CONTROL	1.6
IMPROVEMENTS TO SITE	1.2
BUILDINGS & STRUCTURES	1.4

Advanced Air-Blown IGCC

CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY

TITLE/DEFINITION

Case:	Transport Reactor (2010)			
Plant Size:	398.1 (MW,net)	HeatRate:	6,870	(Btu/kWh)
Primary/Secondary Fuel(type):	Illnois #6	Cost:	1.26	($/MMBtu)
Design/Construction:	3 (years)	BookLife:	20	(years)
TPC(Plant Cost) Year:	1998 (Jan.)	TPI Year:	2005	(Jan.)
Capacity Factor:	85 (%)			

CAPITAL INVESTMENT		**$x1000**	**$/kW**
Process Capital & Facilities		281,703	707.6
Engineering(incl.C.M.,H.O.& Fee)		22,536	56.6
Process Contingency		21,471	53.9
Project Contingency		56,850	142.8
TOTAL PLANT COST(TPC)		$382,559	960.9
TOTAL CASH EXPENDED	$382,559		
AFDC	$30,106		
TOTAL PLANT INVESTMENT(TPI)		$412,665	1036.5
Royalty Allowance			
Preproduction Costs		10,310	25.9
Inventory Capital		3,269	8.2
Initial Catalyst & Chemicals(w/equip.)			
Land Cost		450	1.1
TOTAL CAPITAL REQUIREMENT(TCR)		$426,694	1071.8

OPERATING & MAINTENANCE COSTS (1998 Dollars)	**$x1000**	**$/kW-yr**
Operating Labor	4,717	11.8
Maintenance Labor	3,208	8.1
Maintenance Material	4,812	12.1
Administrative & Support Labor	1,981	5.0
TOTAL OPERATION & MAINTENANCE	$14,719	37.0
FIXED O & M	31.42	$/kW-yr
VARIABLE O & M	0.07	¢/kWh

CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars)	**$x1000**	**¢/kWh**
Water	525	0.02
Chemicals	1,285	0.04
Other Consumables		
Waste Disposal	846	0.03
TOTAL CONSUMABLE OPERATING COSTS	$2,656	0.09
BY-PRODUCT CREDITS (1998 Dollars)	($4,534)	-0.15
FUEL COST (1998 Dollars)	$25,562	0.86

	1st Year (2005 $)		**Levelized (10th.Year $)**	
PRODUCTION COST SUMMARY		**¢/kWh**		**¢/kWh**
Fixed O & M	31.4/kW-yr	0.42	31.4/kW-yr	0.42
Variable O & M		0.07		0.07
Consumables		0.09		0.09
By-product Credit		-0.15		-0.15
Fuel		0.78		0.74
TOTAL PRODUCTION COST		1.22		1.18
LEVELIZED CARRYING CHARGES(Capital)			144.7/kW-yr	1.94
LEVELIZED (10th.Year) BUSBAR COST OF POWER				3.12

ESTIMATE BASIS/FINANCIAL CRITERIA for REVENUE REQUIREMENT CALCULATIONS

GENERAL DATA/CHARACTERISTICS

Case Title:	Transport Reactor (2010)			
Unit Size:/Plant Size:	398.1	MW,net	398.1	MWe
Location:	Middletown, USA			
Fuel: Primary/Secondary	Illnois #6			
Energy From Primary/Secondary Fuels	6,870	Btu/kWh		Btu/kWh
Levelized Capacity Factor / Preproduction(equivalent months):	85	%	1	months
Capital Cost Year Dollars (Reference Year Dollars):	1998	(January)		
Delivered Cost of Primary/Secondary Fuel	1.26	$/MBtu		$/MBtu
Design/Construction Period:	3	years		
Plant Startup Date (1st. Year Dollars):	2005	(January)		
Land Area/Unit Cost	300	acre	$1,500	/acre

FINANCIAL CRITERIA

Project Book Life:	20	years		
Book Salvage Value:		%		
Project Tax Life:	20	years		
Tax Depreciation Method:	Accel. based on ACRS Class			
Property Tax Rate:	1.0	% per year		
Insurance Tax Rate:	1.0	% per year		
Federal Income Tax Rate:	34.0	%		
State Income Tax Rate:	6.0	%		
Investment Tax Credit/% Eligible		%		%
Economic Basis:	10th.Year	Constant Dollars		

Capital Structure	% of Total	Cost(%)
Common Equity	20	16.5
Preferred Stock		
Debt	80	5.8
Weighted Cost of Capital:(after tax)		6.2 %

Escalation Rates	Over Book Life		1998 to 2005	
General		% per year		% per year
Primary Fuel	-1.1	% per year	-1.36	% per year
Secondary Fuel	1.2	% per year	0.041	% per year

Client: DEPARTMENT OF ENERGY
Project: Market Based Advanced Coal Power Systems
Report Date: 14-Aug-98
08:50 AM

TOTAL PLANT COST SUMMARY

Case: Transport Reactor (2010)
Plant Size: 398.1 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING	5,486	1,737	4,365	306		**$11,895**	952		2,569	**$15,416**	39
2	COAL & SORBENT PREP & FEED	5,568	775	3,580	251		**$10,173**	814	343	2,266	**$13,596**	34
3	FEEDWATER & MISC. BOP SYSTEMS	5,332	2,747	4,131	289		**$12,500**	1,000		3,236	**$16,736**	42
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries	14,365		7,725	541		**$22,631**	1,810	5,658	6,020	**$36,118**	91
4.2	High Temperature Cooling	4,394		2,363	165		**$6,923**	554	1,038	1,703	**$10,218**	26
4.3	Recycle Gas System	1,799		1,342	94		**$3,235**	259	485	796	**$4,775**	12
4.4-4.9	Other Gasification Equipment	5,936	3,684	3,555	249		**$13,424**	1,074	1,128	3,662	**$19,288**	48
	SUBTOTAL 4	*26,494*	*3,684*	*14,985*	*1,049*		***$46,212***	*3,697*	*8,310*	*12,181*	***$70,400***	*177*
5	HOT GAS CLEANUP & PIPING	33,305	4,211	12,718	890		**$51,124**	4,090	9,044	12,921	**$77,179**	194
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	43,435		3,306	231		**$46,973**	3,758	3,523	5,425	**$59,680**	150
6.2-6.9	Combustion Turbine Accessories		148	170	12		**$330**	26		107	**$463**	1
	SUBTOTAL 6	*43,435*	*148*	*3,477*	*243*		***$47,303***	*3,784*	*3,523*	*5,532*	***$60,143***	*151*
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	12,666		1,821	127		**$14,614**	1,169		1,578	**$17,362**	44
7.2-7.9	HRSG Accessories, Ductwork and Stack	1,876	698	1,325	93		**$3,993**	319		598	**$4,910**	12
	SUBTOTAL 7	*14,543*	*698*	*3,146*	*220*		***$18,607***	*1,489*		*2,176*	***$22,272***	*56*
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	10,806		1,978	138		**$12,922**	1,034		1,396	**$15,351**	39
8.2-8.9	Turbine Plant Auxiliaries and Steam Pipin	5,256	160	2,882	202		**$8,500**	680		1,581	**$10,761**	27
	SUBTOTAL 8	*16,061*	*160*	*4,860*	*340*		***$21,422***	*1,714*		*2,976*	***$26,112***	*66*
9	COOLING WATER SYSTEM	3,713	2,057	3,500	245		**$9,515**	761		1,846	**$12,123**	30
10	ASH/SPENT SORBENT HANDLING SYS	3,630	798	1,472	103		**$6,003**	480	252	1,019	**$7,754**	19
11	ACCESSORY ELECTRIC PLANT	8,939	2,252	5,834	408		**$17,434**	1,395		3,063	**$21,892**	55
12	INSTRUMENTATION & CONTROL	5,222	1,463	5,436	380		**$12,501**	1,000		2,098	**$15,599**	39
13	IMPROVEMENTS TO SITE	1,848	1,063	3,701	259		**$6,872**	550		2,226	**$9,648**	24
14	BUILDINGS & STRUCTURES		4,264	5,493	384		**$10,141**	811		2,738	**$13,691**	34
	TOTAL COST	**$173,578**	**$26,057**	**$76,699**	**$5,369**		**$281,703**	**$22,536**	**$21,471**	**$56,850**	**$382,559**	**961**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 08:50 AM

TOTAL PLANT COST SUMMARY

Case: Transport Reactor (2010)
Plant Size: 398.1 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
1.1	Coal Receive & Unload	1,441		793	56		$2,289	183		494	$2,967	7
1.2	Coal Stackout & Reclaim	1,862		508	36		$2,406	192		520	$3,118	8
1.3	Coal Conveyors & Yd Crush	1,731		503	35		$2,269	182		490	$2,941	7
1.4	Other Coal Handling	453		116	8		$577	46		125	$748	2
1.5	Sorbent Receive & Unload											
1.6	Sorbent Stackout,Storage & Reclaim											
1.7	Sorbent Conveyors											
1.8	Other Sorbent Handling											
1.9	Coal & Sorbent Hnd.Foundations		1,737	2,445	171		$4,354	348		940	$5,642	14
	SUBTOTAL 1.	**$5,486**	**$1,737**	**$4,365**	**$306**		**$11,895**	**$952**		**$2,569**	**$15,416**	**39**
2	COAL & SORBENT PREP & FEED											
2.1	Coal Crushing & Drying	741	116	278	19		$1,154	92		249	$1,496	4
2.2	Prepared Coal Storage & Feed	255	57	45	3		$360	29		78	$467	1
2.3	Coal & Sorbent Feed System	4,356		2,336	163		$6,855	548	343	1,549	$9,295	23
2.4	Misc.Coal Prep & Feed	217	148	532	37		$933	75		202	$1,210	3
2.5	Sorbent Prep Equipment											
2.6	Sorbent Storage & Feed											
2.7	Sorbent Injection System											
2.8	Booster Air Supply System											
2.9	Coal & Sorbent Feed Foundation		455	389	27		$871	70		188	$1,129	3
	SUBTOTAL 2.	**$5,568**	**$775**	**$3,580**	**$251**		**$10,173**	**$814**	**$343**	**$2,266**	**$13,596**	**34**
3	FEEDWATER & MISC. BOP SYSTEMS											
3.1	FeedwaterSystem	828	1,611	860	60		$3,359	269		726	$4,354	11
3.2	Water Makeup & Pretreating	330	35	189	13		$567	45		184	$796	2
3.3	Other Feedwater Subsystems	493	184	168	12		$857	69		185	$1,110	3
3.4	Service Water Systems	25	54	191	13		$284	23		92	$399	1
3.5	Other Boiler Plant Systems	1,078	435	1,090	76		$2,679	214		579	$3,472	9
3.6	FO Supply Sys & Nat Gas	95	180	340	24		$639	51		138	$828	2
3.7	Waste Treatment Equipment	655		384	27		$1,066	85		345	$1,497	4
3.8	Misc. Power Plant Equipment	1,827	247	911	64		$3,048	244		988	$4,280	11
	SUBTOTAL 3.	**$5,332**	**$2,747**	**$4,131**	**$289**		**$12,500**	**$1,000**		**$3,236**	**$16,736**	**42**
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries	14,365		7,725	541		$22,631	1,810	5,658	6,020	$36,118	91
4.2	High Temperature Cooling	4,394		2,363	165		$6,923	554	1,038	1,703	$10,218	26
4.3	Recycle Gas System	1,799		1,342	94		$3,235	259	485	796	$4,775	12
4.4	Booster Air Compression	5,936		1,482	104		$7,522	602	1,128	1,850	$11,102	28
4.5	Misc. Gasification Equipment	w/4.1&4.2		w/4.1&4.2								
4.6	Other Gasification Equipment		645	265	19		$929	74		201	$1,204	3
4.8	Major Component Rigging	w/4.1&4.2		w/4.1&4.2								
4.9	Gasification Foundations		3,039	1,808	127		$4,973	398		1,611	$6,982	18
	SUBTOTAL 4.	**$26,494**	**$3,684**	**$14,985**	**$1,049**		**$46,212**	**$3,697**	**$8,310**	**$12,181**	**$70,400**	**177**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 08:50 AM

TOTAL PLANT COST SUMMARY

Case: Transport Reactor (2010)
Plant Size: 398.1 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
5	HOT GAS CLEANUP & PIPING											
5.1	Transport Reactor	5,706		3,069	215		$8,990	719	1,348	2,211	$13,269	33
5.2	Sulfur Recovery (Sulfuric Acid)	12,890		4,079	286		$17,255	1,380	2,588	4,245	$25,469	64
5.3	Chloride Guard	7,203		1,710	120		$9,032	723	2,258	2,403	$14,415	36
5.4	Particulate Removal	4,836		1,026	72		$5,934	475	1,483	1,578	$9,470	24
5.5	Blowback Gas Systems	2,669	1,736	988	69		$5,462	437	1,365	1,453	$8,717	22
5.6	Fuel Gas Piping		2,099	1,594	112		$3,805	304		822	$4,931	12
5.9	HGCU Foundations		376	253	18		$646	52		209	$907	2
	SUBTOTAL 5.	**$33,305**	**$4,211**	**$12,718**	**$890**		**$51,124**	**$4,090**	**$9,044**	**$12,921**	**$77,179**	**194**
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	43,435		3,306	231		$46,973	3,758	3,523	5,425	$59,680	150
6.2	Combustion Turbine Accessories	w/6.1		w/6.1								
6.3	Compressed Air Piping											
6.9	Combustion Turbine Foundations		148	170	12		$330	26		107	$463	1
	SUBTOTAL 6.	**$43,435**	**$148**	**$3,477**	**$243**		**$47,303**	**$3,784**	**$3,523**	**$5,532**	**$60,143**	**151**
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	12,666		1,821	127		$14,614	1,169		1,578	$17,362	44
7.2	HRSG Accessories											
7.3	Ductwork		606	520	36		$1,163	93		251	$1,507	4
7.4	Stack	1,876		713	50		$2,639	211		285	$3,135	8
7.9	HRSG,Duct & Stack Foundations		92	92	6		$191	15		62	$268	1
	SUBTOTAL 7.	**$14,543**	**$698**	**$3,146**	**$220**		**$18,607**	**$1,489**		**$2,176**	**$22,272**	**56**
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	10,806		1,978	138		$12,922	1,034		1,396	$15,351	39
8.2	Turbine Plant Auxiliaries	83		192	13		$289	23		31	$343	1
8.3	Condenser & Auxiliaries	2,138		592	41		$2,771	222		299	$3,292	8
8.4	Steam Piping	3,035		1,599	112		$4,746	380		1,025	$6,150	15
8.9	TG Foundations		160	500	35		$695	56		225	$976	2
	SUBTOTAL 8.	**$16,061**	**$160**	**$4,860**	**$340**		**$21,422**	**$1,714**		**$2,976**	**$26,112**	**66**
9	COOLING WATER SYSTEM											
9.1	Cooling Towers	2,845		631	44		$3,521	282		380	$4,183	11
9.2	Circulating Water Pumps	416		40	3		$459	37		50	$545	1
9.3	Circ.Water System Auxiliaries	51		7	1		$59	5		6	$70	0
9.4	Circ.Water Piping		987	1,109	78		$2,173	174		469	$2,816	7
9.5	Make-up Water System	113		170	12		$295	24		64	$382	1
9.6	Component Cooling Water Sys	288	344	256	18		$905	72		196	$1,173	3
9.9	Circ.Water System Foundations		726	1,288	90		$2,104	168		682	$2,954	7
	SUBTOTAL 9.	**$3,713**	**$2,057**	**$3,500**	**$245**		**$9,515**	**$761**		**$1,846**	**$12,123**	**30**
10	ASH/SPENT SORBENT HANDLING SYS											
10.1	Gasifier Ash Removal	1,067		572	40		$1,679	134	252	310	$2,375	6
10.2	Gasifier Ash Depressurization	438	21	100	7		$566	45		92	$703	2
10.3	Cleanup Ash Depressurization	1,046	129	231	16		$1,423	114		230	$1,767	4
10.4	High Temperature Ash Piping											
10.5	Other Ash Recovery Equipment											
10.6	Ash Storage Silos	247		271	19		$537	43		87	$667	2
10.7	Ash Transport & Feed Equipment	322		81	6		$408	33		66	$507	1
10.8	Misc. Ash Handling Equipment	511	626	189	13		$1,340	107		217	$1,664	4
10.9	Ash/Spent Sorbent Foundation		21	28	2		$51	4		16	$71	0
	SUBTOTAL 10.	**$3,630**	**$798**	**$1,472**	**$103**		**$6,003**	**$480**	**$252**	**$1,019**	**$7,754**	**19**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 08:50 AM

TOTAL PLANT COST SUMMARY

Case: Transport Reactor (2010)
Plant Size: 398.1 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
11	ACCESSORY ELECTRIC PLANT											
11.1	Generator Equipment	1,393		221	15		$1,629	130		176	$1,936	5
11.2	Station Service Equipment	2,015		166	12		$2,192	175		237	$2,604	7
11.3	Switchgear & Motor Control	1,606		267	19		$1,892	151		307	$2,350	6
11.4	Conduit & Cable Tray		969	3,039	213		$4,220	338		911	$5,469	14
11.5	Wire & Cable		1,040	1,038	73		$2,151	172		465	$2,787	7
11.6	Protective Equipment		85	283	20		$388	31		63	$482	1
11.7	Standby Equipment	646		14	1		$661	53		107	$821	2
11.8	Main Power Transformers	3,281		368	26		$3,674	294		595	$4,563	11
11.9	Electrical Foundations		158	438	31		$627	50		203	$880	2
	SUBTOTAL 11.	**$8,939**	**$2,252**	**$5,834**	**$408**		**$17,434**	**$1,395**		**$3,063**	**$21,892**	**55**
12	INSTRUMENTATION & CONTROL											
12.1	IGCC Control Equipment											
12.2	Combustion Turbine Control											
12.3	Steam Turbine Control											
12.4	Other Major Component Control	490		299	21		$811	65		131	$1,007	3
12.5	Signal Processing Equipment	w/12.7		w/12.7								
12.6	Control Boards,Panels & Racks	118		69	5		$191	15		41	$248	1
12.7	Computer & Accessories	3,751		137	10		$3,898	312		421	$4,630	12
12.8	Instrument Wiring & Tubing		1,463	4,547	318		$6,328	506		1,367	$8,201	21
12.9	Other I & C Equipment	863		383	27		$1,273	102		138	$1,513	4
	SUBTOTAL 12.	**$5,222**	**$1,463**	**$5,436**	**$380**		**$12,501**	**$1,000**		**$2,098**	**$15,599**	**39**
13	IMPROVEMENTS TO SITE											
13.1	Site Preparation		31	617	43		$692	55		224	$971	2
13.2	Site Improvements		1,031	1,273	89		$2,393	191		775	$3,360	8
13.3	Site Facilities	1,848		1,811	127		$3,786	303		1,227	$5,316	13
	SUBTOTAL 13.	**$1,848**	**$1,063**	**$3,701**	**$259**		**$6,872**	**$550**		**$2,226**	**$9,648**	**24**
14	BUILDINGS & STRUCTURES											
14.1	Combustion Turbine Area		223	141	10		$374	30		101	$504	1
14.2	Steam Turbine Building		1,757	2,786	195		$4,738	379		1,279	$6,396	16
14.3	Administration Building		424	343	24		$791	63		214	$1,068	3
14.4	Circulation Water Pumphouse		84	49	3		$136	11		37	$184	0
14.5	Water Treatment Buildings		529	575	40		$1,144	92		309	$1,545	4
14.6	Machine Shop		217	165	12		$394	32		106	$532	1
14.7	Warehouse		351	252	18		$620	50		167	$837	2
14.8	Other Buildings & Structures		210	182	13		$405	32		109	$547	1
14.9	Waste Treating Building & Str.		470	999	70		$1,539	123		415	$2,077	5
	SUBTOTAL 14.		**$4,264**	**$5,493**	**$384**		**$10,141**	**$811**		**$2,738**	**$13,691**	**34**
	TOTAL COST	**$173,578**	**$26,057**	**$76,699**	**$5,369**		**$281,703**	**$22,536**	**$21,471**	**$56,850**	**$382,559**	**961**

CONTINGENCY FACTORS

Transport Reactor (2010)

Item/Description	Contingency Factors(%) %Process	%Project
COAL & SORBENT HANDLING		20.0
COAL & SORBENT PREP & FEED	3.4	20.0
FEEDWATER & MISC. BOP SYSTEMS		24.0
GASIFIER & ACCESSORIES		
Gasifier & Auxiliaries	25.0	20.0
High Temperature Cooling	15.0	20.0
Recycle Gas System	15.0	20.0
Other Gasification Equipment	8.4	23.4
HOT GAS CLEANUP & PIPING	17.7	20.1
COMBUSTION TURBINE/ACCESSORIES		
Combustion Turbine Generator	7.5	10.0
Combustion Turbine Accessories		30.0
HRSG, DUCTING & STACK		
Heat Recovery Steam Generator		10.0
HRSG Accessories, Ductwork and Stack		13.9
STEAM TURBINE GENERATOR		
Steam TG & Accessories		10.0
Turbine Plant Auxiliaries and Steam Piping		17.2
COOLING WATER SYSTEM		18.0
ASH/SPENT SORBENT HANDLING SYS	4.2	15.1
ACCESSORY ELECTRIC PLANT		16.3
INSTRUMENTATION & CONTROL		15.5
IMPROVEMENTS TO SITE		30.0
BUILDINGS & STRUCTURES		25.0

OPERATING LABOR REQUIREMENTS			
Transport Reactor (2010)			
Operating Labor Rate(base):	25.89	$/hour	
Operating Labor Burden:	30.00	% of base	
Labor O-H Charge Rate:	25.00	% of labor	
Operating Labor Requirements(O.J.)per Shift:			
Category	1 unit/mod.		Total Plant
Skilled Operator	2.0		2.0
Operator	10.0		10.0
Foreman	1.0		1.0
Lab Tech's, etc.	3.0		3.0
TOTAL-O.J.'s	16.0		16.0

CONSUMABLES, BY-PRODUCTS & FUELS DATA			
Transport Reactor (2010)			
Item/Description	Consumption Initial	/Day	Unit Cost
Water(/1000 gallons)		2,117	0.80
Chemicals*			
MU & WT Chem.(lbs)**	189,152	6,305	0.16
Limestone (ton)**			16.25
Z Sorb (lbs)**	20,517	683.9	3.50
Nahcolite(ton)**	82	2.7	270.00
Other			
Supplemental Fuel(MBtu)**			
Gases,N2 etc.(/100scf)			
L.P. Steam(/1000 pounds)			
Waste Disposal			
Sludge(ton)			
Slag(ton)		273	10.00
By-products & Emissions			
Sulfuric Acid(pounds)		215	68.00
Fuel(ton)		2,813	29.29

MAINTENANCE FACTORS
Transport Reactor (2010)

Item/Description	Maintenance %
COAL & SORBENT HANDLING	2.0
COAL & SORBENT PREP & FEED	3.1
FEEDWATER & MISC. BOP SYSTEMS	1.9
GASIFIER & ACCESSORIES	
Gasifier & Auxiliaries	5.0
High Temperature Cooling	4.5
Recycle Gas System	4.0
Other Gasification Equipment	2.8
HOT GAS CLEANUP & PIPING	4.4
COMBUSTION TURBINE/ACCESSORIES	
Combustion Turbine Generator	14.2
Combustion Turbine Accessories	0.5
HRSG, DUCTING & STACK	
Heat Recovery Steam Generator	2.0
HRSG Accessories, Ductwork and Stack	1.5
STEAM TURBINE GENERATOR	
Steam TG & Accessories	1.5
Turbine Plant Auxiliaries and Steam Piping	1.7
COOLING WATER SYSTEM	1.3
ASH/SPENT SORBENT HANDLING SYS	3.2
ACCESSORY ELECTRIC PLANT	1.5
INSTRUMENTATION & CONTROL	1.6
IMPROVEMENTS TO SITE	1.2
BUILDINGS & STRUCTURES	1.4

Advanced Oxygen-Blown IGCC

CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY

TITLE/DEFINITION

Case:	Destec (2010-"H")			
Plant Size:	427.7 (MW,net)	HeatRate:	6,968	(Btu/kWh)
Primary/Secondary Fuel(type):	Illnois #6	Cost:	1.26	($/MMBtu)
Design/Construction:	2.5 (years)	BookLife:	20	(years)
TPC(Plant Cost) Year:	1998 (Jan.)	TPI Year:	2005	(Jan.)
Capacity Factor:	85 (%)			

CAPITAL INVESTMENT		**$x1000**	**$/kW**
Process Capital & Facilities		363,220	849.2
Engineering(incl.C.M.,H.O.& Fee)		29,058	67.9
Process Contingency		14,258	33.3
Project Contingency		58,589	137.0
TOTAL PLANT COST(TPC)		$465,125	1087.4
TOTAL CASH EXPENDED	$465,125		
AFDC	$28,647		
TOTAL PLANT INVESTMENT(TPI)		$493,772	1154.4
Royalty Allowance			
Preproduction Costs		12,171	28.5
Inventory Capital		3,781	8.8
Initial Catalyst & Chemicals(w/equip.)			
Land Cost		450	1.1
TOTAL CAPITAL REQUIREMENT(TCR)		$510,175	1192.7

OPERATING & MAINTENANCE COSTS (1998 Dollars)	**$x1000**	**$/kW-yr**
Operating Labor	4,717	11.0
Maintenance Labor	3,855	9.0
Maintenance Material	5,782	13.5
Administrative & Support Labor	2,143	5.0
TOTAL OPERATION & MAINTENANCE	$16,497	38.6
FIXED O & M	32.78	$/kW-yr
VARIABLE O & M	0.08	¢/kWh

CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars)	**$x1000**	**¢/kWh**
Water	633	0.02
Chemicals	1,489	0.05
Other Consumables		
Waste Disposal	948	0.03
TOTAL CONSUMABLE OPERATING COSTS	$3,070	0.10
BY-PRODUCT CREDITS (1998 Dollars)	($4,942)	-0.16
FUEL COST (1998 Dollars)	$27,855	0.87

	1st Year (2005 $)		**Levelized (10th.Year $)**	
PRODUCTION COST SUMMARY		**¢/kWh**		**¢/kWh**
Fixed O & M	32.8/kW-yr	0.44	32.8/kW-yr	0.44
Variable O & M		0.08		0.08
Consumables		0.10		0.10
By-product Credit		-0.16		-0.16
Fuel		0.79		0.75
TOTAL PRODUCTION COST		1.25		1.21
LEVELIZED CARRYING CHARGES(Capital)			161.0/kW-yr	2.16
LEVELIZED (10th.Year) BUSBAR COST OF POWER				3.38

ESTIMATE BASIS/FINANCIAL CRITERIA for REVENUE REQUIREMENT CALCULATIONS

GENERAL DATA/CHARACTERISTICS

Case Title:	Destec (2010-"H")			
Unit Size:/Plant Size:	427.7	MW,net	427.7	MWe
Location:	Middletown, USA			
Fuel: Primary/Secondary	Illnois #6			
Energy From Primary/Secondary Fuels	6,968	Btu/kWh		Btu/kWh
Levelized Capacity Factor / Preproduction(equivalent months):	85	%	1	months
Capital Cost Year Dollars (Reference Year Dollars):	1998	(January)		
Delivered Cost of Primary/Secondary Fuel	1.26	$/MBtu		$/MBtu
Design/Construction Period:	2.5	years		
Plant Startup Date (1st. Year Dollars):	2005	(January)		
Land Area/Unit Cost	300	acre	$1,500	/acre

FINANCIAL CRITERIA

Project Book Life:	20	years		
Book Salvage Value:		%		
Project Tax Life:	20	years		
Tax Depreciation Method:	Accel. based on ACRS Class			
Property Tax Rate:	1.0	% per year		
Insurance Tax Rate:	1.0	% per year		
Federal Income Tax Rate:	34.0	%		
State Income Tax Rate:	6.0	%		
Investment Tax Credit/% Eligible		%		%
Economic Basis:	10th.Year	Constant Dollars		

Capital Structure	% of Total	Cost(%)
Common Equity	20	16.5
Preferred Stock		
Debt	80	5.8
Weighted Cost of Capital:(after tax)	6.2 %	

Escalation Rates	Over Book Life		1998 to 2005	
General		% per year		% per year
Primary Fuel	-1.1	% per year	-1.36	% per year
Secondary Fuel	1.2	% per year	0.041	% per year

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 11:02 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2010-"H")
Plant Size: 427.7 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING	5,752	1,154	5,023	352		**$12,281**	982		2,653	**$15,916**	37
2	COAL & SORBENT PREP & FEED	6,977	1,605	7,535	527		**$16,644**	1,332	559	2,444	**$20,978**	49
3	FEEDWATER & MISC. BOP SYSTEMS	5,803	2,825	4,504	315		**$13,447**	1,076		3,505	**$18,028**	42
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries(Destec)	9,257		9,429	660		**$19,346**	1,548	1,935	2,283	**$25,111**	59
4.2	High Temperature Cooling	15,118		15,405	1,078		**$31,602**	2,528	3,160	3,729	**$41,019**	96
4.3	ASU/Oxidant Compression	57,300		w/equip.			**$57,300**	4,584		6,188	**$68,072**	159
4.4-4.9	Other Gasification Equipment		3,924	2,194	154		**$6,271**	502		1,793	**$8,566**	20
	SUBTOTAL 4	*81,675*	*3,924*	*27,027*	*1,892*		***$114,519***	*9,161*	*5,095*	*13,993*	***$142,768***	*334*
5	HOT GAS CLEANUP & PIPING	26,369	2,264	9,371	656		**$38,659**	3,093	4,547	9,438	**$55,737**	130
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	43,435		3,306	231		**$46,973**	3,758	3,523	5,425	**$59,680**	140
6.2-6.9	Combustion Turbine Accessories		148	170	12		**$330**	26		107	**$463**	1
	SUBTOTAL 6	*43,435*	*148*	*3,477*	*243*		***$47,303***	*3,784*	*3,523*	*5,532*	***$60,143***	*141*
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	13,255		1,905	133		**$15,294**	1,224		1,652	**$18,169**	42
7.2-7.9	HRSG Accessories, Ductwork and Stack	1,997	743	1,410	99		**$4,249**	340		637	**$5,226**	12
	SUBTOTAL 7	*15,252*	*743*	*3,316*	*232*		***$19,543***	*1,563*		*2,288*	***$23,395***	*55*
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	11,689		2,140	150		**$13,978**	1,118		1,510	**$16,606**	39
8.2-8.9	Turbine Plant Auxiliaries and Steam Pipin	5,646	172	3,097	217		**$9,132**	731		1,698	**$11,561**	27
	SUBTOTAL 8	*17,335*	*172*	*5,236*	*367*		***$23,110***	*1,849*		*3,208*	***$28,167***	*66*
9	COOLING WATER SYSTEM	3,997	2,227	3,766	264		**$10,253**	820		1,991	**$13,064**	31
10	ASH/SPENT SORBENT HANDLING SYS	3,726	686	3,177	222		**$7,811**	625	534	1,039	**$10,009**	23
11	ACCESSORY ELECTRIC PLANT	12,384	4,091	10,067	705		**$27,247**	2,180		4,858	**$34,285**	80
12	INSTRUMENTATION & CONTROL	6,517	1,548	5,752	403		**$14,220**	1,138		2,327	**$17,685**	41
13	IMPROVEMENTS TO SITE	2,006	1,153	4,017	281		**$7,458**	597		2,416	**$10,471**	24
14	BUILDINGS & STRUCTURES		4,505	5,812	407		**$10,724**	858		2,895	**$14,477**	34
	TOTAL COST	**$231,228**	**$27,045**	**$98,081**	**$6,866**		**$363,220**	**$29,058**	**$14,258**	**$58,589**	**$465,125**	**1087**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98

Project: Market Based Advanced Coal Power Systems 11:02 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2010-"H")

Plant Size: 427.7 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
1.1	Coal Receive & Unload	1,510		831	58		$2,400	192		518	$3,110	7
1.2	Coal Stackout & Reclaim	1,952		533	37		$2,522	202		545	$3,268	8
1.3	Coal Conveyors & Yd Crush	1,815		527	37		$2,379	190		514	$3,083	7
1.4	Other Coal Handling	475		122	9		$605	48		131	$784	2
1.5	Sorbent Receive & Unload											
1.6	Sorbent Stackout & Reclaim											
1.7	Sorbent Conveyors											
1.8	Other Sorbent Handling											
1.9	Coal & Sorbent Hnd.Foundations		1,154	3,010	211		$4,375	350		945	$5,670	13
	SUBTOTAL 1.	**$5,752**	**$1,154**	**$5,023**	**$352**		**$12,281**	**$982**		**$2,653**	**$15,916**	**37**
2	COAL & SORBENT PREP & FEED											
2.1	Coal Crushing & Drying	967	151	363	25		$1,506	121		325	$1,952	5
2.2	Prepared Coal Storage & Feed	333	75	59	4		$470	38		102	$609	1
2.3	Slurry Prep & Feed	5,394		5,403	378		$11,175	894	559	1,263	$13,891	32
2.4	Misc.Coal Prep & Feed	283	193	695	49		$1,218	97		263	$1,579	4
2.5	Sorbent Prep Equipment											
2.6	Sorbent Storage & Feed											
2.7	Sorbent Injection System											
2.8	Booster Air Supply System											
2.9	Coal & Sorbent Feed Foundation		1,187	1,016	71		$2,274	182		491	$2,947	7
	SUBTOTAL 2.	**$6,977**	**$1,605**	**$7,535**	**$527**		**$16,644**	**$1,332**	**$559**	**$2,444**	**$20,978**	**49**
3	FEEDWATER & MISC. BOP SYSTEMS											
3.1	FeedwaterSystem	809	1,573	840	59		$3,281	262		709	$4,252	10
3.2	Water Makeup & Pretreating	376	40	216	15		$647	52		210	$909	2
3.3	Other Feedwater Subsystems	482	180	164	11		$837	67		181	$1,084	3
3.4	Service Water Systems	29	62	218	15		$324	26		105	$456	1
3.5	Other Boiler Plant Systems	1,230	497	1,244	87		$3,059	245		661	$3,964	9
3.6	FO Supply Sys & Nat Gas	106	199	376	26		$707	57		153	$917	2
3.7	Waste Treatment Equipment	748		438	31		$1,217	97		394	$1,709	4
3.8	Misc. Power Plant Equipment	2,023	274	1,008	71		$3,375	270		1,093	$4,738	11
	SUBTOTAL 3.	**$5,803**	**$2,825**	**$4,504**	**$315**		**$13,447**	**$1,076**		**$3,505**	**$18,028**	**42**
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries(Destec)	9,257		9,429	660		$19,346	1,548	1,935	2,283	$25,111	59
4.2	High Temperature Cooling	15,118		15,405	1,078		$31,602	2,528	3,160	3,729	$41,019	96
4.3	ASU/Oxidant Compression	57,300		w/equip.			$57,300	4,584		6,188	$68,072	159
4.4	Booster Air Compression											
4.5	Misc. Gasification Equipment	w/4.1&4.2		w/4.1&4.2								
4.6	Other Gasification Equipment		767	316	22		$1,105	88		119	$1,313	3
4.8	Major Component Rigging	w/4.1&4.2		w/4.1&4.2								
4.9	Gasification Foundations		3,157	1,878	131		$5,166	413		1,674	$7,253	17
	SUBTOTAL 4.	**$81,675**	**$3,924**	**$27,027**	**$1,892**		**$114,519**	**$9,161**	**$5,095**	**$13,993**	**$142,768**	**334**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 11:02 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2010-"H")
Plant Size: 427.7 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
5	HOT GAS CLEANUP & PIPING											
5.1	Transport Reactor	4,126		2,219	155		$6,500	520	975	1,599	$9,595	22
5.2	Sulfur Recovery (Sulfuric Acid)	13,608		4,306	301		$18,216	1,457	911	4,117	$24,701	58
5.3	Chloride Guard	3,255		772	54		$4,081	326	1,020	1,086	$6,514	15
5.4	Particulate Removal	4,163		513	36		$4,712	377	1,178	1,253	$7,520	18
5.5	Blowback Gas Systems	1,217	396	225	16		$1,853	148	463	493	$2,958	7
5.6	Fuel Gas Piping		910	691	48		$1,649	132		356	$2,137	5
5.9	HGCU Foundations		958	644	45		$1,647	132		534	$2,313	5
	SUBTOTAL 5.	**$26,369**	**$2,264**	**$9,371**	**$656**		**$38,659**	**$3,093**	**$4,547**	**$9,438**	**$55,737**	**130**
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	43,435		3,306	231		$46,973	3,758	3,523	5,425	$59,680	140
6.2	Combustion Turbine Accessories	w/6.1		w/6.1								
6.3	Compressed Air Piping											
6.9	Combustion Turbine Foundations		148	170	12		$330	26		107	$463	1
	SUBTOTAL 6.	**$43,435**	**$148**	**$3,477**	**$243**		**$47,303**	**$3,784**	**$3,523**	**$5,532**	**$60,143**	**141**
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	13,255		1,905	133		$15,294	1,224		1,652	$18,169	42
7.2	HRSG Accessories											
7.3	Ductwork		645	554	39		$1,238	99		267	$1,604	4
7.4	Stack	1,997		758	53		$2,809	225		303	$3,337	8
7.9	HRSG,Duct & Stack Foundations		98	98	7		$203	16		66	$285	1
	SUBTOTAL 7.	**$15,252**	**$743**	**$3,316**	**$232**		**$19,543**	**$1,563**		**$2,288**	**$23,395**	**55**
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	11,689		2,140	150		$13,978	1,118		1,510	$16,606	39
8.2	Turbine Plant Auxiliaries	89		207	14		$310	25		33	$368	1
8.3	Condenser & Auxiliaries	2,297		635	44		$2,977	238		321	$3,536	8
8.4	Steam Piping	3,261		1,718	120		$5,099	408		1,101	$6,608	15
8.9	TG Foundations		172	537	38		$747	60		242	$1,048	2
	SUBTOTAL 8.	**$17,335**	**$172**	**$5,236**	**$367**		**$23,110**	**$1,849**		**$3,208**	**$28,167**	**66**
9	COOLING WATER SYSTEM											
9.1	Cooling Towers	3,048		676	47		$3,772	302		407	$4,481	10
9.2	Circulating Water Pumps	446		43	3		$491	39		53	$584	1
9.3	Circ.Water System Auxiliaries	54		8	1		$63	5		7	$75	0
9.4	Circ.Water Piping		1,057	1,188	83		$2,328	186		503	$3,017	7
9.5	Make-up Water System	121		182	13		$316	25		68	$409	1
9.6	Component Cooling Water Sys	327	392	291	20		$1,030	82		223	$1,335	3
9.9	Circ.Water System Foundations		778	1,379	97		$2,254	180		730	$3,164	7
	SUBTOTAL 9.	**$3,997**	**$2,227**	**$3,766**	**$264**		**$10,253**	**$820**		**$1,991**	**$13,064**	**31**
10	ASH/SPENT SORBENT HANDLING SYS											
10.1	Slag Dewatering & Cooling	2,582		2,574	180		$5,336	427	534	630	$6,926	16
10.2	Gasifier Ash Depressurization											
10.3	Cleanup Ash Depressurization											
10.4	High Temperature Ash Piping											
10.5	Other Ash Recovery Equipment											
10.6	Ash Storage Silos	262		288	20		$569	46		92	$707	2
10.7	Ash Transport & Feed Equipment	341		86	6		$432	35		70	$537	1
10.8	Misc. Ash Handling Equipment	542	664	200	14		$1,420	114		230	$1,764	4
10.9	Ash/Spent Sorbent Foundation		22	29	2		$54	4		17	$76	0
	SUBTOTAL 10.	**$3,726**	**$686**	**$3,177**	**$222**		**$7,811**	**$625**	**$534**	**$1,039**	**$10,009**	**23**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 11:02 AM

TOTAL PLANT COST SUMMARY

Case: Destec (2010-"H")
Plant Size: 427.7 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
11	ACCESSORY ELECTRIC PLANT											
11.1	Generator Equipment	1,540		245	17		$1,802	144		195	$2,141	5
11.2	Station Service Equipment	3,814		314	22		$4,150	332		448	$4,930	12
11.3	Switchgear & Motor Control	3,040		506	35		$3,581	287		580	$4,448	10
11.4	Conduit & Cable Tray		1,833	5,752	403		$7,988	639		1,725	$10,353	24
11.5	Wire & Cable		1,968	1,965	138		$4,071	326		879	$5,276	12
11.6	Protective Equipment		111	370	26		$507	41		82	$630	1
11.7	Standby Equipment	288		6	0		$295	24		48	$367	1
11.8	Main Power Transformers	3,701		415	29		$4,146	332		672	$5,149	12
11.9	Electrical Foundations		179	494	35		$707	57		229	$993	2
	SUBTOTAL 11.	**$12,384**	**$4,091**	**$10,067**	**$705**		**$27,247**	**$2,180**		**$4,858**	**$34,285**	**80**
12	INSTRUMENTATION & CONTROL											
12.1	IGCC Control Equipment											
12.2	Combustion Turbine Control											
12.3	Steam Turbine Control											
12.4	Other Major Component Control	519		317	22		$858	69		139	$1,065	2
12.5	Signal Processing Equipment	W/12.7		w/12.7								
12.6	Control Boards,Panels & Racks	124		73	5		$202	16		44	$262	1
12.7	Computer & Accessories	4,961		145	10		$5,117	409		553	$6,078	14
12.8	Instrument Wiring & Tubing		1,548	4,811	337		$6,696	536		1,446	$8,678	20
12.9	Other I & C Equipment	913		406	28		$1,347	108		146	$1,601	4
	SUBTOTAL 12.	**$6,517**	**$1,548**	**$5,752**	**$403**		**$14,220**	**$1,138**		**$2,327**	**$17,685**	**41**
13	IMPROVEMENTS TO SITE											
13.1	Site Preparation		34	670	47		$751	60		243	$1,054	2
13.2	Site Improvements		1,119	1,382	97		$2,598	208		842	$3,647	9
13.3	Site Facilities	2,006		1,966	138		$4,110	329		1,332	$5,770	13
	SUBTOTAL 13.	**$2,006**	**$1,153**	**$4,017**	**$281**		**$7,458**	**$597**		**$2,416**	**$10,471**	**24**
14	BUILDINGS & STRUCTURES											
14.1	Combustion Turbine Area		223	141	10		$374	30		101	$504	1
14.2	Steam Turbine Building		1,863	2,955	207		$5,026	402		1,357	$6,785	16
14.3	Administration Building		449	363	25		$837	67		226	$1,131	3
14.4	Circulation Water Pumphouse		89	52	4		$144	12		39	$195	0
14.5	Water Treatment Buildings		560	609	43		$1,211	97		327	$1,635	4
14.6	Machine Shop		230	175	12		$417	33		113	$563	1
14.7	Warehouse		371	267	19		$657	53		177	$887	2
14.8	Other Buildings & Structures		222	193	13		$429	34		116	$579	1
14.9	Waste Treating Building & Str.		497	1,058	74		$1,629	130		440	$2,199	5
	SUBTOTAL 14.		**$4,505**	**$5,812**	**$407**		**$10,724**	**$858**		**$2,895**	**$14,477**	**34**
	TOTAL COST	**$231,228**	**$27,045**	**$98,081**	**$6,866**		**$363,220**	**$29,058**	**$14,258**	**$58,589**	**$465,125**	**1087**

CONTINGENCY FACTORS

Destec (2010-"H")

Item/Description	Contingency Factors(%) %Process	%Project
COAL & SORBENT HANDLING		20.0
COAL & SORBENT PREP & FEED	3.4	13.2
FEEDWATER & MISC. BOP SYSTEMS		24.1
GASIFIER & ACCESSORIES		
Gasifier & Auxiliaries(Destec)	10.0	10.0
High Temperature Cooling	10.0	10.0
ASU/Oxidant Compression		10.0
Other Gasification Equipment		26.5
HOT GAS CLEANUP & PIPING	11.8	20.4
COMBUSTION TURBINE/ACCESSORIES		
Combustion Turbine Generator	7.5	10.0
Combustion Turbine Accessories		30.0
HRSG, DUCTING & STACK		
Heat Recovery Steam Generator		10.0
HRSG Accessories, Ductwork and Stack		13.9
STEAM TURBINE GENERATOR		
Steam TG & Accessories		10.0
Turbine Plant Auxiliaries and Steam Piping		17.2
COOLING WATER SYSTEM		18.0
ASH/SPENT SORBENT HANDLING SYS	6.8	11.6
ACCESSORY ELECTRIC PLANT		16.5
INSTRUMENTATION & CONTROL		15.2
IMPROVEMENTS TO SITE		30.0
BUILDINGS & STRUCTURES		25.0

OPERATING LABOR REQUIREMENTS

Destec (2010-"H")

Operating Labor Rate(base):	25.89	$/hour
Operating Labor Burden:	30.00	% of base
Labor O-H Charge Rate:	25.00	% of labor

Operating Labor Requirements(O.J.)per Shift:

Category	1 unit/mod.	Total Plant
Skilled Operator	2.0	2.0
Operator	10.0	10.0
Foreman	1.0	1.0
Lab Tech's, etc.	3.0	3.0
TOTAL-O.J.'s	16.0	16.0

CONSUMABLES, BY-PRODUCTS & FUELS DATA

Destec (2010-"H")

Item/Description	Consumption Initial	Consumption /Day	Unit Cost
Water(/1000 gallons)		2,551	0.80
Chemicals			
MU & WT Chem.(lbs)	227,943	7,598	0.16
Limestone (ton)			16.25
Z Sorb (ton)**	24,430	814.3	3.50
Nahcolite(ton)	85	2.8	270.00
Other			
Supplemental Fuel(MBtu)			
Gases,N2 etc.(/100scf)			1.50
L.P. Steam(/1000 pounds)			
Waste Disposal			
Sludge(ton)			
Slag(ton)		306	10.00
By-products & Emissions			
Sulfuric Acid(pounds)		234	68.00
Fuel(ton)		3,066	29.29

MAINTENANCE FACTORS
Destec (2010-"H")

Item/Description	Maintenance %
COAL & SORBENT HANDLING	2.0
COAL & SORBENT PREP & FEED	2.9
FEEDWATER & MISC. BOP SYSTEMS	1.9
GASIFIER & ACCESSORIES	
Gasifier & Auxiliaries(Destec)	5.0
High Temperature Cooling	4.5
ASU/Oxidant Compression	4.0
Other Gasification Equipment	0.8
HOT GAS CLEANUP & PIPING	4.4
COMBUSTION TURBINE/ACCESSORIES	
Combustion Turbine Generator	14.2
Combustion Turbine Accessories	0.5
HRSG, DUCTING & STACK	
Heat Recovery Steam Generator	2.0
HRSG Accessories, Ductwork and Stack	1.5
STEAM TURBINE GENERATOR	
Steam TG & Accessories	1.5
Turbine Plant Auxiliaries and Steam Piping	1.7
COOLING WATER SYSTEM	1.3
ASH/SPENT SORBENT HANDLING SYS	3.0
ACCESSORY ELECTRIC PLANT	1.5
INSTRUMENTATION & CONTROL	1.6
IMPROVEMENTS TO SITE	1.2
BUILDINGS & STRUCTURES	1.4

2nd-Generation PFBC with Boost

CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY

TITLE/DEFINITION

Case:	2gPFBCw/Boost			
Plant Size:	379.2 (MW,net)	HeatRate:	7,269	(Btu/kWh)
Primary/Secondary Fuel(type):	Illnois #6	Cost:	1.26	($/MMBtu)
Design/Construction:	3 (years)	BookLife:	20	(years)
TPC(Plant Cost) Year:	1998 (Jan.)	TPI Year:	2005	(Jan.)
Capacity Factor:	85 (%)			

CAPITAL INVESTMENT		**$x1000**	**$/kW**
Process Capital & Facilities		287,411	758.0
Engineering(incl.C.M.,H.O.& Fee)		22,993	60.6
Process Contingency		18,752	49.5
Project Contingency		50,379	132.9
TOTAL PLANT COST(TPC)		$379,535	1000.9
TOTAL CASH EXPENDED	$379,535		
AFDC	$23,376		
TOTAL PLANT INVESTMENT(TPI)		$402,911	1062.6
Royalty Allowance			
Preproduction Costs		10,316	27.2
Inventory Capital		3,459	9.1
Initial Catalyst & Chemicals(w/equip.)			
Land Cost		450	1.2
TOTAL CAPITAL REQUIREMENT(TCR)		$417,135	1100.1

OPERATING & MAINTENANCE COSTS (1998 Dollars)	**$x1000**	**$/kW-yr**
Operating Labor	3,538	9.3
Maintenance Labor	3,200	8.4
Maintenance Material	4,800	12.7
Administrative & Support Labor	1,684	4.4
TOTAL OPERATION & MAINTENANCE	$13,221	34.9

FIXED O & M 29.64 $/kW-yr

VARIABLE O & M 0.07 ¢/kWh

CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars)	**$x1000**	**¢/kWh**
Water	733	0.03
Chemicals	2,862	0.10
Other Consumables		
Waste Disposal	2,340	0.08
TOTAL CONSUMABLE OPERATING COSTS	$5,936	0.21

BY-PRODUCT CREDITS (1998 Dollars)

FUEL COST (1998 Dollars)	$25,760	0.91

	1st Year (2005 $)		**Levelized (10th.Year $)**	
PRODUCTION COST SUMMARY		**¢/kWh**		**¢/kWh**
Fixed O & M	29.6/kW-yr	0.40	29.6/kW-yr	0.40
Variable O & M		0.07		0.07
Consumables		0.21		0.21
By-product Credit				
Fuel		0.83		0.79
TOTAL PRODUCTION COST		1.51		1.46
LEVELIZED CARRYING CHARGES(Capital)			148.5/kW-yr	1.99
LEVELIZED (10th.Year) BUSBAR COST OF POWER				3.46

ESTIMATE BASIS/FINANCIAL CRITERIA for REVENUE REQUIREMENT CALCULATIONS

GENERAL DATA/CHARACTERISTICS

Case Title:	2gPFBCw/Boost			
Unit Size:/Plant Size:	379.2	MW,net	379.2	MWe
Location:	Middletown, USA			
Fuel: Primary/Secondary	Illnois #6			
Energy From Primary/Secondary Fuels	7,269	Btu/kWh		Btu/kWh
Levelized Capacity Factor / Preproduction(equivalent months):	85	%	1	months
Capital Cost Year Dollars (Reference Year Dollars):	1998	(January)		
Delivered Cost of Primary/Secondary Fuel	1.26	$/MBtu		$/MBtu
Design/Construction Period:	3	years		
Plant Startup Date (1st. Year Dollars):	2005	(January)		
Land Area/Unit Cost	300	acre	$1,500	/acre

FINANCIAL CRITERIA

Project Book Life:	20	years		
Book Salvage Value:		%		
Project Tax Life:	20	years		
Tax Depreciation Method:	Accel. based on ACRS Class			
Property Tax Rate:	1.0	% per year		
Insurance Tax Rate:	1.0	% per year		
Federal Income Tax Rate:	34.0	%		
State Income Tax Rate:	6.0	%		
Investment Tax Credit/% Eligible		%		%
Economic Basis:	10th.Year	Constant Dollars		

Capital Structure	% of Total	Cost(%)
Common Equity	20	16.5
Preferred Stock		
Debt	80	5.8
Weighted Cost of Capital:(after tax)		6.2 %

Escalation Rates	Over Book Life		1998 to 2005	
General		% per year		% per year
Primary Fuel	-1.1	% per year	-1.36	% per year
Secondary Fuel	1.2	% per year	0.041	% per year

Client: DEPARTMENT OF ENERGY
Project: Market Based Advanced Coal Power Systems
Report Date: 14-Aug-98
10:52 AM

TOTAL PLANT COST SUMMARY

Case: 2gPFBCw/Boost
Plant Size: 379.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING	7,538	1,270	3,245	227		**$12,280**	982		2,794	**$16,056**	42
2	COAL & SORBENT PREP & FEED	12,633	1,254	2,838	199		**$16,924**	1,354	609	2,596	**$21,483**	57
3	FEEDWATER & MISC. BOP SYSTEMS	6,107	3,212	4,799	336		**$14,453**	1,156		3,709	**$19,319**	51
4	CARBONIZER, PFBC & PFB HTX											
4.1	PFB PRESSURE VESSEL	3,031		448	31		**$3,510**	281	526	432	**$4,749**	13
4.2	PFBC Boiler	1,672		357	25		**$2,055**	164	308	253	**$2,780**	7
4.3	PFBC Economizer	24,307		4,599	322		**$29,227**	2,338	4,384	3,595	**$39,544**	104
4.4-4.9	Other PFBC Equipment	1,092	6,241	4,082	286		**$11,701**	936	68	2,566	**$15,272**	40
	SUBTOTAL 4	*30,102*	*6,241*	*9,486*	*664*		***$46,493***	*3,719*	*5,287*	*6,845*	***$62,345***	*164*
5	HOT GAS CLEANUP & PIPING	15,015	4,968	4,582	321		**$24,886**	1,991	4,270	6,259	**$37,405**	99
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	50,976		2,820	197		**$53,994**	4,319	8,099	6,641	**$73,053**	193
6.2-6.9	C.T. Booster Air System & BOA	785	1,018	1,141	69		**$3,013**	241		707	**$3,961**	10
	SUBTOTAL 6	*51,762*	*1,018*	*3,960*	*267*		***$57,006***	*4,561*	*8,099*	*7,348*	***$77,014***	*203*
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	7,241		927	65		**$8,233**	659		889	**$9,781**	26
7.2-7.9	HRSG Accessories, Ductwork and Stack	1,528	611	1,136	80		**$3,355**	268		513	**$4,136**	11
	SUBTOTAL 7	*8,769*	*611*	*2,063*	*144*		***$11,588***	*927*		*1,402*	***$13,917***	*37*
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	17,120		2,666	187		**$19,972**	1,598		2,157	**$23,727**	63
8.2-8.9	Turbine Plant Auxiliaries and Steam Pipin	2,687	4,169	3,254	228		**$10,339**	827		1,874	**$13,039**	34
	SUBTOTAL 8	*19,807*	*4,169*	*5,920*	*414*		***$30,311***	*2,425*		*4,031*	***$36,767***	*97*
9	COOLING WATER SYSTEM	4,286	2,498	4,325	303		**$11,411**	913		2,237	**$14,561**	38
10	ASH/SPENT SORBENT HANDLING SYS	6,504	1,192	1,531	107		**$9,334**	747	486	1,580	**$12,147**	32
11	ACCESSORY ELECTRIC PLANT	9,721	2,715	6,934	485		**$19,855**	1,588		3,503	**$24,946**	66
12	INSTRUMENTATION & CONTROL	5,319	1,439	5,507	385		**$12,650**	1,012		2,121	**$15,783**	42
13	IMPROVEMENTS TO SITE		3,349	5,430	380		**$9,159**	733		2,967	**$12,859**	34
14	BUILDINGS & STRUCTURES		4,635	6,006	420		**$11,061**	885		2,986	**$14,932**	39
	TOTAL COST	**$177,562**	**$38,572**	**$66,624**	**$4,653**		**$287,411**	**$22,993**	**$18,752**	**$50,379**	**$379,535**	**1001**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98

Project: Market Based Advanced Coal Power Systems 10:52 AM

TOTAL PLANT COST SUMMARY

Case: 2gPFBCw/Boost

Plant Size: 379.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
1.1	Coal Receive & Unload	1,448		797	56		$2,300	184		497	$2,981	8
1.2	Coal Stackout & Reclaim	1,871		511	36		$2,417	193		522	$3,133	8
1.3	Coal Conveyors & Yd Crush	1,739		505	35		$2,280	182		492	$2,955	8
1.4	Other Coal Handling	455		117	8		$580	46		125	$752	2
1.5	Sorbent Receive & Unload	57		21	1		$79	6		21	$106	0
1.6	Sorbent Stackout & Reclaim	914		202	14		$1,130	90		305	$1,525	4
1.7	Sorbent Conveyors	755	66	198	14		$1,032	83		279	$1,394	4
1.8	Other Sorbent Handling	197	43	124	9		$373	30		101	$504	1
1.9	Coal & Sorbent Hnd.Foundations	104	1,160	771	54		$2,089	167		451	$2,707	7
	SUBTOTAL 1.	**$7,538**	**$1,270**	**$3,245**	**$227**		**$12,280**	**$982**		**$2,794**	**$16,056**	**42**
2	COAL & SORBENT PREP & FEED											
2.1	Coal Crushing & Drying	631	98	364	26		$1,119	90		242	$1,450	4
2.2	Coal Conveyor / Storage	217	49	38	3		$307	25		66	$397	1
2.3	Coal Injection System	8,205	106	835	58		$9,204	736	460	1,040	$11,440	30
2.4	Misc.Coal Prep & Feed	184	126	453	32		$794	64		172	$1,029	3
2.5	Sorbent Prep Equipment	410	36	165	12		$623	50		135	$807	2
2.6	Sorbent Storage & Feed	108		25	2		$134	11		36	$181	0
2.7	Sorbent Injection System	2,701	35	231	16		$2,982	239	149	505	$3,875	10
2.8	Booster Air Supply System	178	83	109	8		$377	30		102	$510	1
2.9	Coal & Sorbent Feed Foundation		722	618	43		$1,383	111		299	$1,792	5
	SUBTOTAL 2.	**$12,633**	**$1,254**	**$2,838**	**$199**		**$16,924**	**$1,354**	**$609**	**$2,596**	**$21,483**	**57**
3	FEEDWATER & MISC. BOP SYSTEMS											
3.1	FeedwaterSystem	981	1,908	1,018	71		$3,978	318		859	$5,156	14
3.2	Water Makeup & Pretreating	418	44	240	17		$719	57		233	$1,009	3
3.3	Other Feedwater Subsystems	584	218	198	14		$1,014	81		219	$1,315	3
3.4	Service Water Systems	32	69	242	17		$360	29		117	$506	1
3.5	Other Boiler Plant Systems	1,366	551	1,381	97		$3,395	272		733	$4,400	12
3.6	FO Supply Sys & Nat Gas	94	178	335	23		$630	50		136	$817	2
3.7	Waste Treatment Equipment	830		486	34		$1,351	108		438	$1,897	5
3.8	Misc. Power Plant Equipment	1,802	244	898	63		$3,006	240		974	$4,220	11
	SUBTOTAL 3.	**$6,107**	**$3,212**	**$4,799**	**$336**		**$14,453**	**$1,156**		**$3,709**	**$19,319**	**51**
4	CARBONIZER, PFBC & PFB HTX											
4.1	PFB PRESSURE VESSEL	3,031		448	31		$3,510	281	526	432	$4,749	13
4.2	PFBC Boiler	1,672		357	25		$2,055	164	308	253	$2,780	7
4.3	PFBC Economizer	24,307		4,599	322		$29,227	2,338	4,384	3,595	$39,544	104
4.4	Interconnecting Pipe		1,467	939	66		$2,472	198		400	$3,070	8
4.5	Misc. PFBC Equipment	392		58	4		$454	36	68	84	$643	2
4.6	Other PFBC Equipment	699	680	480	34		$1,894	151		205	$2,250	6
4.8	Major Component Rigging		1,218	894	63		$2,175	174		352	$2,701	7
4.9	PFBC Structure/Foundation		2,876	1,711	120		$4,707	377		1,525	$6,608	17
	SUBTOTAL 4.	**$30,102**	**$6,241**	**$9,486**	**$664**		**$46,493**	**$3,719**	**$5,287**	**$6,845**	**$62,345**	**164**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 10:52 AM

TOTAL PLANT COST SUMMARY

Case: 2gPFBCw/Boost
Plant Size: 379.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
5	HOT GAS CLEANUP & PIPING											
5.1	Barrier Filters	5,054		533	37		$5,625	450	1,406	1,496	$8,977	24
5.2	Primary & Secondary Cyclones	7,642		781	55		$8,478	678	2,119	2,255	$13,531	36
5.3	Hot Gas Piping		4,353	2,973	208		$7,534	603		1,627	$9,764	26
5.4	Blowback Gas & Air Systems	2,318	413	230	16		$2,977	238	744	792	$4,751	13
5.5	Bag House & Accessories											
5.6	Other BH											
5.9	HGCU Foundations		203	65	5		$272	22		88	$382	1
	SUBTOTAL 5.	**$15,015**	**$4,968**	**$4,582**	**$321**		**$24,886**	**$1,991**	**$4,270**	**$6,259**	**$37,405**	**99**
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	50,976		2,820	197		$53,994	4,319	8,099	6,641	$73,053	193
6.2	C.T. Booster Air System & BOA	785	185	152			$1,122	90		182	$1,394	4
6.3	Compressed Air Piping		710	846	59		$1,616	129		436	$2,181	6
6.9	Combustion Turbine Foundations		123	142	10		$275	22		89	$386	1
	SUBTOTAL 6.	**$51,762**	**$1,018**	**$3,960**	**$267**		**$57,006**	**$4,561**	**$8,099**	**$7,348**	**$77,014**	**203**
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	7,241		927	65		$8,233	659		889	$9,781	26
7.2	HRSG Accessories											
7.3	Ductwork		529	454	32		$1,015	81		219	$1,316	3
7.4	Stack	1,528		580	41		$2,149	172		232	$2,553	7
7.9	HRSG,Duct & Stack Foundations		82	101	7		$190	15		62	$267	1
	SUBTOTAL 7.	**$8,769**	**$611**	**$2,063**	**$144**		**$11,588**	**$927**		**$1,402**	**$13,917**	**37**
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	17,120		2,666	187		$19,972	1,598		2,157	$23,727	63
8.2	Turbine Plant Auxiliaries		100	233	16		$350	28		38	$416	1
8.3	Condenser & Auxiliaries	2,687		724	51		$3,462	277		374	$4,112	11
8.4	Steam Piping		3,864	2,036	142		$6,042	483		1,305	$7,831	21
8.9	TG Foundations		205	261	18		$484	39		157	$680	2
	SUBTOTAL 8.	**$19,807**	**$4,169**	**$5,920**	**$414**		**$30,311**	**$2,425**		**$4,031**	**$36,767**	**97**
9	COOLING WATER SYSTEM											
9.1	Cooling Towers	3,280		781	55		$4,116	329		444	$4,889	13
9.2	Circulating Water Pumps	517		50	4		$570	46		62	$678	2
9.3	Circ.Water System Auxiliaries	64		9	1		$74	6		8	$87	0
9.4	Circ.Water Piping		1,244	1,398	98		$2,740	219		592	$3,550	9
9.5	Make-up Water System	143		214	15		$371	30		80	$481	1
9.6	Component Cooling Water Sys	283	338	250	18		$888	71		192	$1,151	3
9.9	Circ.Water System Foundations		916	1,623	114		$2,652	212		859	$3,724	10
	SUBTOTAL 9.	**$4,286**	**$2,498**	**$4,325**	**$303**		**$11,411**	**$913**		**$2,237**	**$14,561**	**38**
10	ASH/SPENT SORBENT HANDLING SYS											
10.1	Ash Coolers	w/10.2&10.3		341	24		$364	29		39	$433	1
10.2	Ash Letdown	1,546	8	36	2		$1,592	127	159	282	$2,160	6
10.3	HGCU Ash Depressurization	3,060	46	154	11		$3,271	262	327	579	$4,439	12
10.4	High Temperature Ash Piping											
10.5	Other Ash Recovery Equipment											
10.6	Ash Storage Silos	434		477	33		$944	76		153	$1,173	3
10.7	Ash Transport & Feed Equipment	565		142	10		$717	57		116	$891	2
10.8	Misc. Ash Handling Equipment	899	1,101	333	23		$2,356	188		382	$2,926	8
10.9	Ash/Spent Sorbent Foundation		37	49	3		$89	7		29	$125	0
	SUBTOTAL 10.	**$6,504**	**$1,192**	**$1,531**	**$107**		**$9,334**	**$747**	**$486**	**$1,580**	**$12,147**	**32**

Client: DEPARTMENT OF ENERGY **Report Date:** 14-Aug-98
Project: Market Based Advanced Coal Power Systems 10:52 AM

TOTAL PLANT COST SUMMARY

Case: 2gPFBCw/Boost
Plant Size: 379.2 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
11	ACCESSORY ELECTRIC PLANT											
11.1	Generator Equipment	1,373		273	19		$1,665	133		180	$1,978	5
11.2	Station Service Equipment	2,468		203	14		$2,686	215		290	$3,191	8
11.3	Switchgear & Motor Control	1,968		327	23		$2,318	185		376	$2,879	8
11.4	Conduit & Cable Tray		1,187	3,723	261		$5,170	414		1,117	$6,701	18
11.5	Wire & Cable		1,274	1,272	89		$2,635	211		569	$3,415	9
11.6	Protective Equipment		98	327	23		$449	36		73	$557	1
11.7	Standby Equipment	685		15	1		$701	56		114	$871	2
11.8	Main Power Transformers	3,227		362	25		$3,614	289		585	$4,488	12
11.9	Electrical Foundations		156	430	30		$616	49		200	$865	2
	SUBTOTAL 11.	**$9,721**	**$2,715**	**$6,934**	**$485**		**$19,855**	**$1,588**		**$3,503**	**$24,946**	**66**
12	INSTRUMENTATION & CONTROL											
12.1	PFBC Control Equipment	183		160	11		$354	28		57	$440	1
12.2	Combustion Turbine Control											
12.3	Steam Turbine Control											
12.4	Other Major Component Control	482		295	21		$797	64		129	$990	3
12.5	Signal Processing Equipment	w/12.7		w/12.7								
12.6	Control Boards,Panels & Racks	116		68	5		$188	15		41	$244	1
12.7	Computer & Accessories	3,689		135	9		$3,834	307		414	$4,555	12
12.8	Instrument Wiring & Tubing		1,439	4,472	313		$6,224	498		1,344	$8,067	21
12.9	Other I & C Equipment	849		377	26		$1,252	100		135	$1,488	4
	SUBTOTAL 12.	**$5,319**	**$1,439**	**$5,507**	**$385**		**$12,650**	**$1,012**		**$2,121**	**$15,783**	**42**
13	IMPROVEMENTS TO SITE											
13.1	Site Preparation		37	1,087	76		$1,201	96		389	$1,686	4
13.2	Site Improvements		564	1,107	77		$1,748	140		566	$2,454	6
13.3	Site Facilities		2,748	3,236	227		$6,210	497		2,012	$8,719	23
	SUBTOTAL 13.		**$3,349**	**$5,430**	**$380**		**$9,159**	**$733**		**$2,967**	**$12,859**	**34**
14	BUILDINGS & STRUCTURES											
14.1	Combustion Turbine Area		293	185	13		$491	39		132	$662	2
14.2	Steam Turbine Building		2,075	3,275	229		$5,580	446		1,507	$7,533	20
14.3	Administration Building		421	340	24		$785	63		212	$1,060	3
14.4	Circulation Water Pumphouse		83	49	3		$135	11		37	$183	0
14.5	Water Treatment Buildings		525	570	40		$1,135	91		307	$1,533	4
14.6	Machine Shop		216	164	11		$391	31		106	$528	1
14.7	Warehouse		348	250	18		$616	49		166	$831	2
14.8	Other Buildings & Structures		208	181	13		$402	32		108	$542	1
14.9	Waste Treating Building & Str.		466	991	69		$1,526	122		412	$2,061	5
	SUBTOTAL 14.		**$4,635**	**$6,006**	**$420**		**$11,061**	**$885**		**$2,986**	**$14,932**	**39**
	TOTAL COST	**$177,562**	**$38,572**	**$66,624**	**$4,653**		**$287,411**	**$22,993**	**$18,752**	**$50,379**	**$379,535**	**1001**

CONTINGENCY FACTORS

2gPFBCw/Boost

Item/Description	Contingency Factors(%) %Process	%Project
COAL & SORBENT HANDLING		21.1
COAL & SORBENT PREP & FEED	3.6	13.7
FEEDWATER & MISC. BOP SYSTEMS		23.8
CARBONIZER, PFBC & PFB HTX		
PFB PRESSURE VESSEL	15.0	10.0
PFBC Boiler	15.0	10.0
PFBC Economizer	15.0	10.0
Other PFBC Equipment	0.6	20.2
HOT GAS CLEANUP & PIPING	17.2	20.1
COMBUSTION TURBINE/ACCESSORIES		
Combustion Turbine Generator	15.0	10.0
C.T. Booster Air System & BOA		21.7
HRSG, DUCTING & STACK		
Heat Recovery Steam Generator		10.0
HRSG Accessories, Ductwork and Stack		14.2
STEAM TURBINE GENERATOR		
Steam TG & Accessories		10.0
Turbine Plant Auxiliaries and Steam Piping		16.8
COOLING WATER SYSTEM		18.2
ASH/SPENT SORBENT HANDLING SYS	5.2	15.0
ACCESSORY ELECTRIC PLANT		16.3
INSTRUMENTATION & CONTROL		15.5
IMPROVEMENTS TO SITE		30.0
BUILDINGS & STRUCTURES		25.0

OPERATING LABOR REQUIREMENTS

2gPFBCw/Boost

Operating Labor Rate(base):	25.89	$/hour
Operating Labor Burden:	30.00	% of base
Labor O-H Charge Rate:	25.00	% of labor

Operating Labor Requirements(O.J.)per Shift:

Category	1 unit/mod.	Total Plant
Skilled Operator	2.0	2.0
Operator	7.0	7.0
Foreman	1.0	1.0
Lab Tech's, etc.	2.0	2.0
TOTAL-O.J.'s	12.0	12.0

CONSUMABLES, BY-PRODUCTS & FUELS DATA

2gPFBCw/Boost

Item/Description	Consumption Initial	Consumption /Day	Unit Cost
Water(/1000 gallons)		2,955	0.80
Chemicals			
MU & WT Chem.(lbs)	264,049	8,802	0.16
Limestone (ton)	14,503	483.4	16.25
Z Sorb (ton)**			3.50
Nahcolite(ton)			270.00
Other			
Supplemental Fuel(MBtu)			
Gases,N2 etc.(/100scf)			1.50
L.P. Steam(/1000 pounds)			
Waste Disposal			
Sludge(ton)			
Slag(ton)		754	10.00
By-products & Emissions			
Sulfuric Acid(pounds)			68.00
Fuel(ton)		2,835	29.29

MAINTENANCE FACTORS

2gPFBCw/Boost

Item/Description	Maintenance %
COAL & SORBENT HANDLING	2.5
COAL & SORBENT PREP & FEED	3.1
FEEDWATER & MISC. BOP SYSTEMS	2.0
CARBONIZER, PFBC & PFB HTX	
PFB PRESSURE VESSEL	5.0
PFBC Boiler	4.5
PFBC Economizer	4.0
Other PFBC Equipment	1.6
HOT GAS CLEANUP & PIPING	6.7
COMBUSTION TURBINE/ACCESSORIES	
Combustion Turbine Generator	12.9
C.T. Booster Air System & BOA	2.0
HRSG, DUCTING & STACK	
Heat Recovery Steam Generator	2.0
HRSG Accessories, Ductwork and Stack	1.4
STEAM TURBINE GENERATOR	
Steam TG & Accessories	1.5
Turbine Plant Auxiliaries and Steam Piping	1.7
COOLING WATER SYSTEM	1.3
ASH/SPENT SORBENT HANDLING SYS	3.3
ACCESSORY ELECTRIC PLANT	1.5
INSTRUMENTATION & CONTROL	1.6
IMPROVEMENTS TO SITE	1.3
BUILDINGS & STRUCTURES	1.4

Natural Gas Combined Cycle
“G” Class Gas Turbine

CAPITAL INVESTMENT & REVENUE REQUIREMENT SUMMARY

TITLE/DEFINITION

Case:	Natural Gas Combined Cycle-"G"			
Plant Size:	326.1 (MW,net)	HeatRate:	6,743	(Btu/kWh)
Primary/Secondary Fuel(type):	Natural Gas	Cost:	2.70	($/MMBtu)
Design/Construction:	2.25 (years)	BookLife:	20	(years)
TPC(Plant Cost) Year:	1998 (Jan.)	TPI Year:	2005	(Jan.)
Capacity Factor:	65 (%)			

CAPITAL INVESTMENT		**$x1000**	**$/kW**
Process Capital & Facilities		137,531	421.7
Engineering(incl.C.M.,H.O.& Fee)		11,002	33.7
Process Contingency			
Project Contingency		22,434	68.8
TOTAL PLANT COST(TPC)		$170,968	524.2
TOTAL CASH EXPENDED	$170,968		
AFDC	$6,403		
TOTAL PLANT INVESTMENT(TPI)		$177,371	543.8
Royalty Allowance			
Preproduction Costs		5,157	15.8
Inventory Capital		471	1.4
Initial Catalyst & Chemicals(w/equip.)			
Land Cost		150	0.5
TOTAL CAPITAL REQUIREMENT(TCR)		$183,149	561.6

OPERATING & MAINTENANCE COSTS (1998 Dollars)	**$x1000**	**$/kW-yr**
Operating Labor	1,474	4.5
Maintenance Labor	1,228	3.8
Maintenance Material	1,842	5.6
Administrative & Support Labor	675	2.1
TOTAL OPERATION & MAINTENANCE	$5,219	16.0

FIXED O & M	10.40	$/kW-yr
VARIABLE O & M	0.10	¢/kWh

CONSUMABLE OPERATING COSTS,less Fuel (1998 Dollars)	**$x1000**	**¢/kWh**
Water	429	0.02
Chemicals	249	0.01
Other Consumables		
Waste Disposal		
TOTAL CONSUMABLE OPERATING COSTS	$679	0.04

BY-PRODUCT CREDITS (1998 Dollars)

FUEL COST (1998 Dollars)	$33,837	1.82

	1st Year (2005 $)		**Levelized (10th.Year $)**	
PRODUCTION COST SUMMARY		**¢/kWh**		**¢/kWh**
Fixed O & M	10.4/kW-yr	0.18	10.4/kW-yr	0.18
Variable O & M		0.10		0.10
Consumables		0.04		0.04
By-product Credit				
Fuel		1.83		1.94
TOTAL PRODUCTION COST		2.14		2.26
LEVELIZED CARRYING CHARGES(Capital)			75.8/kW-yr	1.33
LEVELIZED (10th.Year) BUSBAR COST OF POWER				3.59

ESTIMATE BASIS/FINANCIAL CRITERIA for REVENUE REQUIREMENT CALCULATIONS

GENERAL DATA/CHARACTERISTICS

Case Title:	Natural Gas Combined Cycle-"G"			
Unit Size:/Plant Size:	326.1	MW,net	326.1	MWe
Location:	Middletown, USA			
Fuel: Primary/Secondary	Natural Gas			
Energy From Primary/Secondary Fuels	6,743	Btu/kWh		Btu/kWh
Levelized Capacity Factor / Preproduction(equivalent months):	65	%	1	months
Capital Cost Year Dollars (Reference Year Dollars):	1998	(January)		
Delivered Cost of Primary/Secondary Fuel	2.70	$/MBtu		$/MBtu
Design/Construction Period:	2.25	years		
Plant Startup Date (1st. Year Dollars):	2005	(January)		
Land Area/Unit Cost	100	acre	$1,500	/acre

FINANCIAL CRITERIA

Project Book Life:	20	years		
Book Salvage Value:		%		
Project Tax Life:	20	years		
Tax Depreciation Method:	Accel. based on ACRS Class			
Property Tax Rate:	1.0	% per year		
Insurance Tax Rate:	1.0	% per year		
Federal Income Tax Rate:	34.0	%		
State Income Tax Rate:	6.0	%		
Investment Tax Credit/% Eligible		%		%
Economic Basis:	10th.Year	Constant Dollars		

Capital Structure	% of Total	Cost(%)
Common Equity	20	16.5
Preferred Stock		
Debt	80	5.8
Weighted Cost of Capital:(after tax)		6.2 %

Escalation Rates	Over Book Life		1998 to 2005	
General		% per year		% per year
Primary Fuel	1.2	% per year	0.041	% per year
Secondary Fuel	1.2	% per year	0.041	% per year

Client: DEPARTMENT OF ENERGY - Task 36 **Report Date:** 16-Dec-98
Project: Market Based Advanced Coal Power Systems 05:28 PM

TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"G"
Plant Size: 326.1 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
2	COAL & SORBENT PREP & FEED											
3	FEEDWATER & MISC. BOP SYSTEMS	4,835	2,213	3,785	265		**$11,097**	888		2,905	**$14,891**	46
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries											
4.2	High Temperature Cooling											
4.3	Recycle Gas System											
4.4-4.9	Other Gasification Equipment											
	SUBTOTAL 4											
5	HOT GAS CLEANUP & PIPING											
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	39,817		2,820	197		**$42,834**	3,427		4,626	**$50,887**	156
6.2-6.9	Combustion Turbine Accessories		136	157	11		**$305**	24		99	**$428**	1
	SUBTOTAL 6	*39,817*	*136*	*2,977*	*208*		***$43,139***	*3,451*		*4,725*	***$51,315***	*157*
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	12,541		1,803	126		**$14,470**	1,158		1,563	**$17,190**	53
7.2-7.9	HRSG Accessories, Ductwork and Stack	1,750	651	1,236	87		**$3,724**	298		558	**$4,580**	14
	SUBTOTAL 7	*14,291*	*651*	*3,039*	*213*		***$18,194***	*1,456*		*2,121*	***$21,770***	*67*
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	9,644		1,589	111		**$11,345**	908		1,225	**$13,477**	41
8.2-8.9	Turbine Plant Auxiliaries and Steam Pipin	4,365	133	2,394	168		**$7,060**	565		1,313	**$8,937**	27
	SUBTOTAL 8	*14,010*	*133*	*3,983*	*279*		***$18,404***	*1,472*		*2,538*	***$22,415***	*69*
9	COOLING WATER SYSTEM	3,113	1,728	2,934	205		**$7,980**	638		1,549	**$10,168**	31
10	ASH/SPENT SORBENT HANDLING SYS											
11	ACCESSORY ELECTRIC PLANT	7,525	1,799	4,793	336		**$14,454**	1,156		2,530	**$18,140**	56
12	INSTRUMENTATION & CONTROL	2,668	1,367	4,760	333		**$9,128**	730		1,644	**$11,501**	35
13	IMPROVEMENTS TO SITE	1,674	962	3,352	235		**$6,224**	498		2,016	**$8,738**	27
14	BUILDINGS & STRUCTURES		3,731	4,841	339		**$8,911**	713		2,406	**$12,030**	37
	TOTAL COST	**$87,934**	**$12,721**	**$34,464**	**$2,412**		**$137,531**	**$11,002**		**$22,434**	**$170,968**	**524**

Client: DEPARTMENT OF ENERGY - Task 36 **Report Date:** 16-Dec-98

Project: Market Based Advanced Coal Power Systems 05:28 PM

TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"G"

Plant Size: 326.1 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
1	COAL & SORBENT HANDLING											
1.1	Coal Receive & Unload											
1.2	Coal Stackout & Reclaim											
1.3	Coal Conveyors & Yd Crush											
1.4	Other Coal Handling											
1.5	Sorbent Receive & Unload											
1.6	Sorbent Stackout,Storage & Reclaim											
1.7	Sorbent Conveyors											
1.8	Other Sorbent Handling											
1.9	Coal & Sorbent Hnd.Foundations											
	SUBTOTAL 1.											
2	COAL & SORBENT PREP & FEED											
2.1	Coal Crushing & Drying											
2.2	Prepared Coal Storage & Feed											
2.3	Coal & Sorbent Feed System											
2.4	Misc.Coal Prep & Feed											
2.5	Sorbent Prep Equipment											
2.6	Sorbent Storage & Feed											
2.7	Sorbent Injection System											
2.8	Booster Air Supply System											
2.9	Coal & Sorbent Feed Foundation											
	SUBTOTAL 2.											
3	FEEDWATER & MISC. BOP SYSTEMS											
3.1	FeedwaterSystem	593	1,153	615	43		$2,404	192		519	$3,116	10
3.2	Water Makeup & Pretreating	346	37	198	14		$595	48		193	$835	3
3.3	Other Feedwater Subsystems	353	132	120	8		$613	49		132	$794	2
3.4	Service Water Systems	27	57	200	14		$298	24		97	$418	1
3.5	Other Boiler Plant Systems	1,130	456	1,143	80		$2,809	225		607	$3,641	11
3.6	FO Supply Sys & Nat Gas	84	159	300	21		$565	45		122	$732	2
3.7	Waste Treatment Equipment	687		402	28		$1,118	89		362	$1,569	5
3.8	Misc. Power Plant Equipment	1,616	219	805	56		$2,696	216		873	$3,785	12
	SUBTOTAL 3.	**$4,835**	**$2,213**	**$3,785**	**$265**		**$11,097**	**$888**		**$2,905**	**$14,891**	**46**
4	GASIFIER & ACCESSORIES											
4.1	Gasifier & Auxiliaries											
4.2	High Temperature Cooling											
4.3	Recycle Gas System											
4.4	Booster Air Compression											
4.5	Misc. Gasification Equipment	w/4.1&4.2		w/4.1&4.2								
4.6	Other Gasification Equipment											
4.8	Major Component Rigging	w/4.1&4.2		w/4.1&4.2								
4.9	Gasification Foundations											
	SUBTOTAL 4.											

Client: DEPARTMENT OF ENERGY - Task 36 **Report Date:** 16-Dec-98
Project: Market Based Advanced Coal Power Systems 05:28 PM

TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"G"
Plant Size: 326.1 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
5	HOT GAS CLEANUP & PIPING											
5.1	Gas Desulfurization(Trans.Reactor)											
5.2	Sulfur Recovery (Sulfator Sys.)											
5.3	Chloride Guard											
5.4	Particulate Removal											
5.5	Blowback Gas Systems											
5.6	Fuel Gas Piping											
5.9	HGCU Foundations											
	SUBTOTAL 5.											
6	COMBUSTION TURBINE/ACCESSORIES											
6.1	Combustion Turbine Generator	39,817		2,820	197		$42,834	3,427		4,626	$50,887	156
6.2	Combustion Turbine Accessories	w/6.1		w/6.1								
6.3	Compressed Air Piping											
6.9	Combustion Turbine Foundations		136	157	11		$305	24		99	$428	1
	SUBTOTAL 6.	**$39,817**	**$136**	**$2,977**	**$208**		**$43,139**	**$3,451**		**$4,725**	**$51,315**	**157**
7	HRSG, DUCTING & STACK											
7.1	Heat Recovery Steam Generator	12,541		1,803	126		$14,470	1,158		1,563	$17,190	53
7.2	HRSG Accessories											
7.3	Ductwork		565	485	34		$1,085	87		234	$1,406	4
7.4	Stack	1,750		665	47		$2,461	197		266	$2,924	9
7.9	HRSG,Duct & Stack Foundations		86	86	6		$178	14		58	$250	1
	SUBTOTAL 7.	**$14,291**	**$651**	**$3,039**	**$213**		**$18,194**	**$1,456**		**$2,121**	**$21,770**	**67**
8	STEAM TURBINE GENERATOR											
8.1	Steam TG & Accessories	9,644		1,589	111		$11,345	908		1,225	$13,477	41
8.2	Turbine Plant Auxiliaries	69		160	11		$240	19		26	$285	1
8.3	Condenser & Auxiliaries	1,776		491	34		$2,301	184		249	$2,734	8
8.4	Steam Piping	2,521		1,328	93		$3,942	315		851	$5,108	16
8.9	TG Foundations		133	415	29		$577	46		187	$810	2
	SUBTOTAL 8.	**$14,010**	**$133**	**$3,983**	**$279**		**$18,404**	**$1,472**		**$2,538**	**$22,415**	**69**
9	COOLING WATER SYSTEM											
9.1	Cooling Towers	2,381		528	37		$2,947	236		318	$3,501	11
9.2	Circulating Water Pumps	348		33	2		$384	31		41	$456	1
9.3	Circ.Water System Auxiliaries	42		6	0		$49	4		5	$58	0
9.4	Circ.Water Piping		826	928	65		$1,819	146		393	$2,357	7
9.5	Make-up Water System	95		142	10		$247	20		53	$320	1
9.6	Component Cooling Water Sys	246	294	219	15		$774	62		167	$1,003	3
9.9	Circ.Water System Foundations		608	1,078	75		$1,761	141		571	$2,472	8
	SUBTOTAL 9.	**$3,113**	**$1,728**	**$2,934**	**$205**		**$7,980**	**$638**		**$1,549**	**$10,168**	**31**
10	ASH/SPENT SORBENT HANDLING SYS											
10.1	Gasifier Ash Removal											
10.2	Gasifier Ash Depressurization											
10.3	Cleanup Ash Depressurization											
10.4	High Temperature Ash Piping											
10.5	Other Ash Recovery Equipment											
10.6	Ash Storage Silos											
10.7	Ash Transport & Feed Equipment											
10.8	Misc. Ash Handling Equipment											
10.9	Ash/Spent Sorbent Foundation											
	SUBTOTAL 10.											

Client: DEPARTMENT OF ENERGY - Task 36 **Report Date:** 16-Dec-98
Project: Market Based Advanced Coal Power Systems 05:28 PM

TOTAL PLANT COST SUMMARY

Case: Natural Gas Combined Cycle-"G"
Plant Size: 326.1 MW,net **Estimate Type:** Conceptual **Cost Base (Jan)** 1998 ($x1000)

Acct No.	Item/Description	Equipment Cost	Material Cost	Labor Direct	Labor Indirect	Sales Tax	Bare Erected Cost $	Eng'g CM H.O.& Fee	Contingencies Process	Contingencies Project	TOTAL PLANT COST $	TOTAL PLANT COST $/kW
11	ACCESSORY ELECTRIC PLANT											
11.1	Generator Equipment	1,233		196	14		$1,442	115		156	$1,713	5
11.2	Station Service Equipment	1,598		132	9		$1,739	139		188	$2,067	6
11.3	Switchgear & Motor Control	1,274		212	15		$1,501	120		243	$1,864	6
11.4	Conduit & Cable Tray		768	2,411	169		$3,348	268		723	$4,339	13
11.5	Wire & Cable		825	824	58		$1,706	137		369	$2,211	7
11.6	Protective Equipment		69	230	16		$316	25		51	$392	1
11.7	Standby Equipment	585		13	1		$599	48		97	$743	2
11.8	Main Power Transformers	2,835		397	28		$3,260	261		528	$4,049	12
11.9	Electrical Foundations		137	378	26		$542	43		175	$760	2
	SUBTOTAL 11.	**$7,525**	**$1,799**	**$4,793**	**$336**		**$14,454**	**$1,156**		**$2,530**	**$18,140**	**56**
12	INSTRUMENTATION & CONTROL											
12.1	IGCC Control Equipment											
12.2	Combustion Turbine Control											
12.3	Steam Turbine Control											
12.4	Other Major Component Control											
12.5	Signal Processing Equipment	w/12.7		w/12.7								
12.6	Control Boards,Panels & Racks	110		64	5		$179	14		39	$232	1
12.7	Computer & Accessories	1,752		90	6		$1,848	148		200	$2,195	7
12.8	Instrument Wiring & Tubing		1,367	4,247	297		$5,912	473		1,277	$7,661	23
12.9	Other I & C Equipment	806		358	25		$1,189	95		128	$1,413	4
	SUBTOTAL 12.	**$2,668**	**$1,367**	**$4,760**	**$333**		**$9,128**	**$730**		**$1,644**	**$11,501**	**35**
13	IMPROVEMENTS TO SITE											
13.1	Site Preparation		28	559	39		$626	50		203	$880	3
13.2	Site Improvements		934	1,153	81		$2,168	173		702	$3,043	9
13.3	Site Facilities	1,674		1,640	115		$3,429	274		1,111	$4,815	15
	SUBTOTAL 13.	**$1,674**	**$962**	**$3,352**	**$235**		**$6,224**	**$498**		**$2,016**	**$8,738**	**27**
14	BUILDINGS & STRUCTURES											
14.1	Combustion Turbine Area		214	135	9		$359	29		97	$485	1
14.2	Steam Turbine Building		1,520	2,411	169		$4,099	328		1,107	$5,534	17
14.3	Administration Building		396	320	22		$738	59		199	$997	3
14.4	Circulation Water Pumphouse		78	46	3		$127	10		34	$172	1
14.5	Water Treatment Buildings		494	537	38		$1,068	85		288	$1,442	4
14.6	Machine Shop		203	154	11		$368	29		99	$497	2
14.7	Warehouse		327	235	16		$579	46		156	$782	2
14.8	Other Buildings & Structures		196	170	12		$378	30		102	$510	2
14.9	Waste Treating Building & Str.		303	833	58		$1,194	96		322	$1,612	5
	SUBTOTAL 14.		**$3,731**	**$4,841**	**$339**		**$8,911**	**$713**		**$2,406**	**$12,030**	**37**
	TOTAL COST	**$87,934**	**$12,721**	**$34,464**	**$2,412**		**$137,531**	**$11,002**		**$22,434**	**$170,968**	**524**

CONTINGENCY FACTORS

Natural Gas Combined Cycle-"G"

Item/Description	Contingency Factors(%) %Process	%Project
COAL & SORBENT HANDLING		
COAL & SORBENT PREP & FEED		
FEEDWATER & MISC. BOP SYSTEMS		24.2
GASIFIER & ACCESSORIES		
Gasifier & Auxiliaries		
High Temperature Cooling		
Recycle Gas System		
Other Gasification Equipment		
HOT GAS CLEANUP & PIPING		
COMBUSTION TURBINE/ACCESSORIES		
Combustion Turbine Generator		10.0
Combustion Turbine Accessories		30.0
HRSG, DUCTING & STACK		
Heat Recovery Steam Generator		10.0
HRSG Accessories, Ductwork and Stack		13.9
STEAM TURBINE GENERATOR		
Steam TG & Accessories		10.0
Turbine Plant Auxiliaries and Steam Piping		17.2
COOLING WATER SYSTEM		18.0
ASH/SPENT SORBENT HANDLING SYS		
ACCESSORY ELECTRIC PLANT		16.2
INSTRUMENTATION & CONTROL		16.7
IMPROVEMENTS TO SITE		30.0
BUILDINGS & STRUCTURES		25.0

OPERATING LABOR REQUIREMENTS			
Natural Gas Combined Cycle-"G"			
Operating Labor Rate(base):	25.89	$/hour	
Operating Labor Burden:	30.00	% of base	
Labor O-H Charge Rate:	25.00	% of labor	
Operating Labor Requirements(O.J.)per Shift:			
Category	1 unit/mod.		Total Plant
Skilled Operator	1.0		1.0
Operator	2.0		2.0
Foreman	1.0		1.0
Lab Tech's, etc.	1.0		1.0
TOTAL-O.J.'s	5.0		5.0

CONSUMABLES, BY-PRODUCTS & FUELS DATA			
Natural Gas Combined Cycle-"G"			
Item/Description	Consumption Initial	/Day	Unit Cost
Water(/1000 gallons)		2,263	0.80
Chemicals*			
MU & WT Chem.(lbs)**	202,221	6,741	0.16
Limestone (ton)**			15.78
Z Sorb (lbs)**			3.50
Nahcolite(ton)**			270.00
Other			
Supplemental Fuel(MBtu)**			
Gases,N2 etc.(/100scf)			
L.P. Steam(/1000 pounds)			
Waste Disposal			
Sludge(ton)			
Slag(ton)			10.00
By-products & Emissions			
Sulfuric Acid(pounds)			68.00
Fuel(MMBtu)		52,780	2.70

MAINTENANCE FACTORS
Natural Gas Combined Cycle-"G"

Item/Description	Maintenance %
COAL & SORBENT HANDLING	
COAL & SORBENT PREP & FEED	
FEEDWATER & MISC. BOP SYSTEMS	2.0
GASIFIER & ACCESSORIES	
Gasifier & Auxiliaries	
High Temperature Cooling	
Recycle Gas System	
Other Gasification Equipment	
HOT GAS CLEANUP & PIPING	
COMBUSTION TURBINE/ACCESSORIES	
Combustion Turbine Generator	8.4
Combustion Turbine Accessories	0.5
HRSG, DUCTING & STACK	
Heat Recovery Steam Generator	2.0
HRSG Accessories, Ductwork and Stack	1.5
STEAM TURBINE GENERATOR	
Steam TG & Accessories	1.5
Turbine Plant Auxiliaries and Steam Piping	1.7
COOLING WATER SYSTEM	1.3
ASH/SPENT SORBENT HANDLING SYS	
ACCESSORY ELECTRIC PLANT	1.5
INSTRUMENTATION & CONTROL	1.6
IMPROVEMENTS TO SITE	1.2
BUILDINGS & STRUCTURES	1.4